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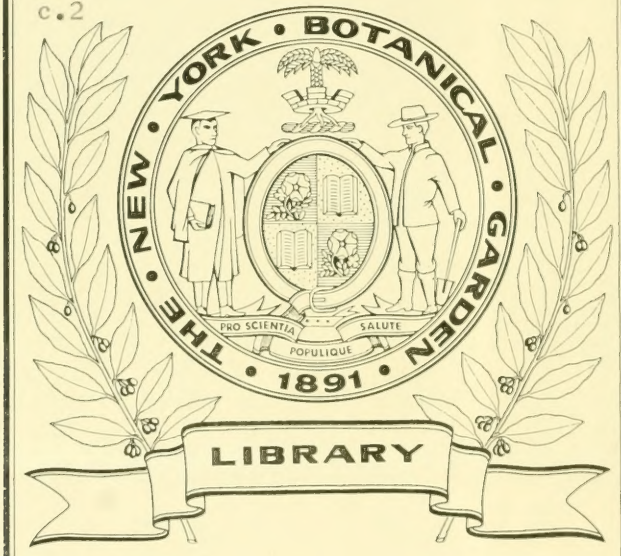

MATERIALS FOR A

FLORA OF THE MALAYAN PENINSULA

PART II

H. N. RIDLEY, M.A., F.R.S., F.L.S., F.R.H.S.
DIRECTOR OF BOTANICAL GARDENS,
SINGAPORE, S.S.

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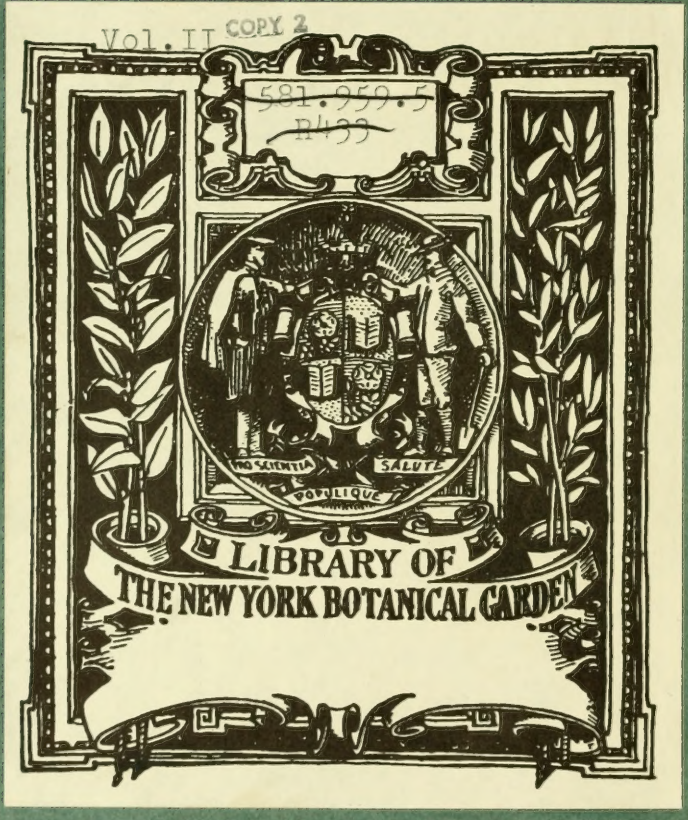

Materials for a Flora of the Malayan Peninsula

by

H. N. RIDLEY, M.A., F.R.S., F.L.S., F.R.H.S.

Director of Botanic Gardens,
Singapore, S.S.

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AUG 17 1965

Materials for a Flora of the Malayan Peninsula.

PART II.

IV. ZINGIBERACEAE.

Herbaceous plants often of large size, stem usually rhizomatous short or long, branches erect, short or tall. Leaves linear ovate or lanceolate petioled sheathing, herbaceous. Inflorescence terminal or rarely lateral on the leafy stems, or on short leafless stems from the rhizome spicate racemose or panicled. Calyx tubular with 3 lobes. Corolla tubular with three petaloid lobes. Stamens fertile 1 to 5, the missing ones quite suppressed or reduced to short processes, or petaloid. Style filiform, stigma 2 or 3 lobed small capitate. Ovary inferior 3 celled rarely 1 celled, placentas 3 axile or parietal ovales. Fruit capsular or baccate, seeds numerous usually enclosed in a sweet aril, rounded or angled, aromatic.

Species about 600. Tropics of both hemispheres with a few species in sub-tropical regions.

§ 1. ZINGIBEREAE, aromatic plants. Fertile stamen 1 with 2 cells.

§ 2. MARANTACEAE, non-aromatic plants. Fertile stamen 1 with a single cell on the edge, three other stamens petaloid.

§ 3. CANNACEAE, non-aromatic. Stamens 4, petaloid one with a single cell on the edge.

§ 4. LOWIACEAE. Fertile stamens five. Lip much larger than the petals, small plants.

§ 5. MUSACEAE. Fertile stamens 5. Lip small resembling the petals, large plants.

§ 1. ZINGIBERACEAE.

Staminodes 2 broad and petaloid.

Spike or panicle terminal on a leafy stem.

Filament long slender, longer than the corolla.

Lip adnate to filament above the corolla ...	1. *Globba.*
Lip free lobes entire	2. *Hedychium.*
Lip adnate to corolla at base, lobes toothed ...	3. *Odontychium.*

Filament short broad. Staminodes broader than petals.
Anther dorsifixed versatile ... ... 4. *Camptandra.*
Anther cells on a broad thin connective, staminodes not broader than petals ... 5. *Kaempferia.*
Anther thick terminal ... ... 6. *Gastrochilus*
Spikes radical cone-like.
Staminodes not broader than corolla lobes ... 7. *Curcuma.*
Staminodes smaller. Anther with long curved arms ... ... 8. *Conamomum.*
Staminodes small, absent, or adnate to lip.
Stamen with a thin flat petaloid filament ... 9. *Costus.*
Filament thick, scapes radical.
Anther with a long curved beak. Lip 3 lobed 10. *Zingiber.*
Anther with two curved arms. Lip broad ... 11. *Amomum.*
Anther with no arms or crest.. Lip narrow ... 12. *Hornstedtia.*
Spike lateral from a leafy stem ... ... 13. *Plagiostachys.*
Panicle lax horizontal creeping from the rhizome ... ... 14. *Elettariopsis.*
Panicle compact erect or pendulous from the rhizome ... ... 15. *Geostachys.*
Panicle terminal on a leafy stem ... ... 16. *Alpinia.*

1. Globba, L.

Slender herbs with a short rhizome. Leaves ovate or lanceolate, sheathing, with a short ligule. Inflorescence terminal panicled, lax. Flowers small yellow white or violet. Calyx tubular 3 toothed regular or irregular. Corolla tube longer, lobes boat shaped reflexed, staminodes similar. Lip base adnate by its edges to the stamen forming a tube, limb narrow deflexed bilobed or entire. Stamen filament much longer slender. Anther small, connective prolonged into a simple margin or with 2 or 4 spurs. Style longer, stigma very small cup-shaped. Ovary 1 celled, placentas 3 parietal. Capsule globose irregularly deluscent, seeds small, with a white aril.

Species about 30. Indian, Chinese and Malayan.

§ 1. Aplanthera. Anthers spurless. Flowers yellow. Lip linear entire ... ... 1. *G. Wallichii.*
Lip short bilobed ... ... 2. *G. uliginosa.*

§ 2. Ceratanthera. Anther 2 spurred.
Flowers yellow. Panicle slender.
Anther spurs narrow subulate from the lower part of the anther.

Leaves lanceolate narrow. Panicle slender ... ... 3. *G. panicoides.*
Leaves oblong. Panicle stout and long ... 4. *G. pendula.*
Anther spurs triangular the whole length of the anther ... ... 5. *G. montana.*
Flower yellow. Panicle short and dense ... 6. *G. Malaccensis.*
Flowers white or violet.
Lip oblong ovate entire ... ... 7. *G. elegans.*
Lip bilobed obcuneate. Leaves glabrous... 8. *G. albiflora.*
Lip bilobed oblong. Leaves broadly lanceolate pubescent ... ... 9. *G. leucantha.*
Lip linear. Leaves oblong lanceolate pubescent ... ... 10. *G. violacea.*

§ 3. MARANTELLA. Anther 4 spurred.
Flowers yellow. Leaves many.
Panicle short and dense.
Leaves and peduncle hairy ... ... 11. *G. aurantiaca.*
Leaves glabrous, peduncle softly pubescent 12. *G. Perakensis.*
Panicle elongate suberect. Bracts red or yellow ... ... 13. *G. variabilis.*
Panicle nodding. Bracts green.
Lip bilobed ... ... 14. *G. cernua.*
Lip entire ... ... 15. *G. brachycarpa.*
Leaf single, panicle dense decurved ... 16. *G. unifolia.*

§ 1. APLANTHERA.

1. G. WALLICHII, Bak, Fl. Brit, Ind. VI. p. 202. Plant about 2 feet tall, lower sheaths dotted purple. Leaves lanceolate acuminate pubescent 5 inches long 1½ inch wide, upper ones smaller sheaths 3 inches long or less hispid. Panicle long and slender, branches distant 1 inch long. Flowers few crowded at the ends orange colour. Bracts lanceolate very small. Calyx campanulate with two long acute lobes and one shorter ⅛ inch long. Staminodes longer linear oblong ¼ inch long. Lip short linear entire with a brown central spot. Filament ½ inch long, anther ⅛ inch long with no margin nor spurs. Capsule globose, smooth. Ridley Journ. Roy. As. Soc. S. Br. Vol. XXXII. p. 89.

G. pendula, Wall. Cat. (not Roxb.).

Penang: (Wallich No. 6533) Moniot's Road (Curtis 455. 2859) Perak: Larut Hills (Fox). On banks, endemic.

2. G. ULIGINOSA, Miq. Fl. Ind. Bat. Supl. p. 613. Stems tufted 2 feet long, sheaths spotted red. Leaves lanceolate acuminate 3 inches wide glabrous above except for some long strigose hairs along the

nerves, pubescent beneath, sheaths hispid. Panicle long and lax with short scattered branches ¼ inch long with 2 or 3 flowers on each. Bracts oblong, obtuse green. Calyx funnel-shaped with rather long acute lobes ⅛ inch long. Corolla tube slender ¼ inch long lobes ovate oblong, upper one boat-shaped ½ inch long orange. Staminodes oblong obtuse. Lip very narrowed and short bilobed, lobes linear obtuse orange with a black central spot. Filament slender ¼ inch long. Anther cells narrow elliptic with no margin or spurs. Baker l.c. 203. Ridley l.c. 90.

Singapore: Bukit Mandai (Ridley); Malacca: Alor Gajah (Ridley); Perak: Larut Hills (Ridley), Goping (King's Coll. 444); Penang: (King in Fl. Brit. Ind.) Damp spots in woods. Distrib. Sumatra.

§ 2. CERATANTHERA.

3. G. PANICOIDES, Miq. Fl. Ind. Bat. Supp. p. 614. Stems tufted 9-24 inches long, slender sheaths at base spotted red, more or less pubescent. Leaves narrow lanceolate acuminate to ovate acuminate 1¾-5 inches long ¾ to 1½ broad, ligule hispid. Panicle slender branches usually short sometimes rather long spreading. Flowers usually few Bracts lanceolate green. Calyx short unequally 3 toothed one tooth much longer than the others lanceolate blunt, orange ⅛ inch long. Corolla tube ½ inch long lobes boat-shaped ¼ inch long orange. Staminodes rather longer oblong. Lip short oblong bilobed orange with a dark brown central spot. Filament 1 inch long anther cells parallel, connective developed all round and prolonged at the base into a pair of subulate spurs. Capsule smooth globose ¼ inch long. Ridley l.c. 91. *Gl. Kingii*, Bak. l.c. 204. *Gl. stenothyrsa*, Bak. l.c.

Singapore: Bukit Timah, Chan Chu Kang (Ridley 6236); Malacca: Sungei Hudang (Derry 99); Negri Sembilan: Perhentian Tinggi (Ridley 9997); Selangor: Batang Berjuntai (7800): Sungei Ujong: Bukit Tumiang (Cantley's coll.); Dindings: Bruas (Ridley 7231); Province Wellesley: Tasek Gelugur (Ridley); Lankawi (Curtis 2642). Distrib. Sumatra, Borneo.

Very common in wet woods, native names "Haliya Hutan," "Meroyan Tingal," "Meroyan B'rchoin," "Pua birah Bunga Lidah Muntah," "Haliya K'ra." The slightly aromatic roots are used in medicine for fever and rheumatism.

4. G. PENDULA, Roxb. Asiatic Researches XI. 359. Fl. Ind. I. 79. A large plant 3 feet or more tall. Leaves oblong cuspidate glabrous, 9 inches long, 4 inches wide, ligule rounded pubescent, sheaths with pubescent edges. Panicle stout sometimes nearly 2 feet long, branches few-flowered short. Bracts lanceolate cadulous. Calyx funnel-shaped ¼ inch long with 3 unequal acute lobes. Corolla tube slender half an inch long, lobes boat-shaped ¼ inch long, orange yellow. staminodes thin oblanceolate obtuse as long. Lip adnate to the stamen

from a little above the staminodes narrow bilobed orange with a maroon central spot. Filament over half an inch long. Anther elliptic horns 2 linear subulate as long as the anther, connective prolonged above the anther into a rounded process.

Roxb. Coromandel Plants t. 228. Horan. Prodr. 20, Hook. fil. Fl. Brit. Ind. VI. 205, Ridl. l.c. 92.

Penang: (Roxburgh) near the waterfall; Perak: Larut Hills (Ridley 2957), Upper Perak (Wray 3700); Pahang: Tahan River (Ridley); Kedah, Yan (Ridley). Distrib. Tavoy, Tenasserim.

5. GL. MONTANA, Ridley l.c. 92. Stems about 2 feet tall. Leaves lanceolate cuspidate thin 7 inches long 1½ inch broad with a long attenuate point glabrous above pubescent beneath, petiole short but distinct ligule rounded pubescent, sheaths very hairy. Panicle long slender 12 to 18 inches, branches 1-2 inches long horizontal rather distant few-flowered. Bracts ovate oblong ⅛ inch long. Calyx campanulate lobes acute ⅛ inch long. Corolla tube slender ½ inch long lobes broadly ovate obtuse ¼ inch long yellow. Staminodes absent. Lip small free for some distance above the corolla apex rounded entire. Filament above the lip ½ inch long. Anther elliptic with large flat triangular wings running its whole length but shorter than the anther.

Kedah, Gunong Jerai, Yan (Ridley). Endemic.

6. G. MALACCENSIS, Ridley l.c. 93. Stems 2 feet tall or more. Leaves lanceolate broad, acuminate rather distant 6 inches long, 2 inches wide, glabrous ligule short rounded and with the sheath pubescent petiole distinct, sometimes half an inch long. Panicle short and compact on a long peduncle nude except for a few distant bracts the lowest nearly 2 inches long linear green; branches short ¼ inch long few-flowered. Calyx cylindric with short acute lobes nearly ¼ inch long. Corolla tube very slender ½ inch long, lobes ovate boat-shaped less than ¼ inch long yellow. Staminodes oblong obtuse as long. Lip short oblong entire. Anther oblong with 2 triangular subulate spurs from the centre of the side, filament ¾ inch long. Capsule globose wrinkled ¼ inch long.

Johor: Gunong Panti (King 216), Batu Pahat (Ridley 1198); Malacca woods at the base of Mount Ophir (Ridley), Bukit Sedanen (Goodenough 1426); Selangor: Bukit Hitam (Kelsall); Sungei Ujong: Bukit Sulu, Bukit Kandong (Cantley's coll.); Perak: Bujong Malacca (Ridley). In hill woods. Native names "Pua Rimbah," "Pua hudang," "Pua Gajah." Used medicinally in childbirth. Endemic.

7. G. ELEGANS, Ridley, l.c. 96. Stems slender over a foot long. Leaves lanceolate acuminate minutely pubescent beneath 5 inches long 1¼ inch wide. Panicle erect rather slender with short stiff spreading branches half an inch long. Bracts persistent lanceolate green ⅛ inch

long. Flowers few crowded at the ends of the branches white. Calyx unequally 3 lobed lobes acute, $\frac{1}{4}$ inch long. Corolla tube $\frac{1}{8}$ inch long lobes oblong ovate obtuse. Staminodes similar. Lip short oblong ovate obtuse entire white with a violet central spot. Filament half inch long. Anther-spurs linear curved up at the ends. Capsule globose smooth $\frac{1}{4}$ inch long.

Dindings: Bruas (Ridley 10347) and Gunong Tungul (9450). Endemic.

8. G. ALBIFLORA, Ridl. l.c. 96. Stems 3 feet tall. Leaves narrowly lanceolate acuminate 8 inches long 1 inch broad glabrous green with a silvery grey variegation on the midrib when young, ligule very short, sheath glabrous. Panicle 12 to 15 inches long with slender distant spreading branches 1 inch long or less. Bracts persistent linear obtuse $\frac{1}{4}$ inch long. Flowers white 1 or 2 on the ends of the branches. Calyx tubular with short lanceolate lobes. Corolla tube very slender $\frac{1}{2}$ inch long, lobes boat-shaped ovate. Staminodes longer oblong linear. Lip short obcuneate bilobed lobes rather long divergent. Filament 3 inches long. Anther oblong, spurs 2 linear acuminate falcate longer.

Penang: Government Hill (Curtis 2851); Tringanu: Bundi, (Rostado). "Munkoa bukit." Endemic.

9. G. LEUCANTHA, Miq. Fl. Ind. Bat. Suppl. p. 612. Rhizome short, roots with tuberous swellings. Stems 2 feet tall or less. Leaves broadly lanceolate acute 8 inches long 3 inches across, very finely pubescent, dark green above purple beneath, sheaths hispid purple spotted, ligule hardly $\frac{1}{8}$ inch long. Panicle terminal lax with spreading branches 2 inches or more long. Bracts ovate white. Calyx tubular with 2 teeth longer than the third $\frac{1}{4}$ inch long, pubescent. Corolla tube slender $\frac{1}{2}$ inch long, lobes boat-shaped $\frac{1}{4}$ inch long. Staminodes narrower oblong longer. Lip short oblong shortly bilobed white with or without a purplish central spot. Stamen 1 inch long. Anther cordate with two slender subulate horns. Ovary white pubescent. Capsule globose $\frac{5}{16}$ inch long, seeds about 8, angled. Ridley l.c. 95. *G. pallidiflora*, Baker, Fl. Brit. Ind. VI. 204. *G. floribunda*, Bak. l.c.

Singapore: Bukit Timah, Bidadari (Ridley 8784); Johore: Tana Runto (Ridley 4614), Gunong Pulai, Gunong Panti, (King 716, 717, 718); Dindings: Lumut (Ridley); Larut (King's Coll. 2291). Distrib. Sumatra.

Abundant in the woods in Singapore. Forms with the leaves on flowering stems suppressed occur, the stems being merely covered with sheaths. The lower branches of the panicle are often bulbilliferous. I have examined the type of *G. floribunda*, Baker, Gunong Panti (King's Coll. 718), and find the anthers two-spurred not spurless as described.

10. G. VIOLACEA, Ridl. l.c. 97. Stems 1 to 2 feet tall rather stout. Leaves large or moderate oblong lanceolate acuminate with a long point covered with strigose scattered hairs on both sides, or scabrid, 7 to 10 inches long, 2 inches wide ligule short very hairy, sheaths stiffly hairy. Panicle of numerous short branches half an inch long stiff and horizontal. Bracts small ovate lanceolate white. Calyx cylindric with 3 short points, one shorter than the others, as long as the corolla tube white. Corolla tube $\frac{1}{4}$ inch long, lobes ovate boat-shaped violet or white. Staminodes longer and narrower violet. Lip very narrow linear grooved and bilobed, violet or white with a darker spot. Filament rather stout. Anther oblong with two linear spurs. Casule globose white, seeds ovoid beaked.

Johore: Gunong Pulai; Selangor: Bukit Hitam (Kelsall); Perak: Bujong Malacca; Gunong Keledang (Ridley 9818), Ipoh (Curtis 3316), Gunong Tuas (Wray 4164); Dindings (Ridley). Endemic.

§ 3. MARANTELLA.

11. G. AURANTIACA, Miq. Fl. Ind. Bat. Supp. p. 613. Stems about 18 inches tall, bases covered with hairy sheaths. Leaves oblong to ovate cuspidate 7 inches long and 3 inches wide or smaller hairy beneath. Panicle short or as much as 8 inches long compact, on a hairy peduncle 18 inches long or less, branches short $\frac{1}{4}$ inch long numerous horizontal. Flowers few orange. Bracts oblong obtuse hairy $\frac{1}{8}$ inch long orange. Pedicels $\frac{1}{4}$ inch long. Calyx funnel-shaped $\frac{1}{4}$ inch long, teeth 3 short blunt. Corolla tube $\frac{1}{2}$ inch long lobes large oblong. Lip short broad oblong bilobed orange with a brown central blotch. Staminodes short oblong. Filament $\frac{1}{4}$ inch long. Anther oblong with 4 triangular teeth. Fruit globose smooth. Ridley l.c. 97.

Malacca: Brisu (Derry 81); Selangor: Sungei Buloh (Ridley 10517), Bukit Hitam; Negri Sembilan: Perhentian Tinggi (Ridley), Gunong Berumlum (Cantley's Coll.); Perak, Larut Hills; Penang: Moniot's Road; Penara Bukit (Ridley 7230). Hill woods to an elevation of 5000 feet common. Native name "Pua Gumbur." Distrib. Sumatra.

12. G. PERAKENSIS, Ridley l.c. 98. Stem stout about a foot or 18 inches tall. Leaves obovate cuspidate, narrowed at the base glabrous, 8 inches long by 4 wide petiole $\frac{1}{4}$ inch long hispid, ligule short oblong peduncle 8 inches long with large ovate orange bracts, upper ones smaller oblong obtuse, softly pubescent and ciliate on the edges. Panicle short dense 1 inch long, branches about half an inch long pubescent. Bracts short broad ovate orange. Calyx short tubular $\frac{1}{8}$ inch long pubescent, orange. Corolla tube twice as long lobes ovate. Lip short broad oblong bilobed orange with a brown spot. Staminodes linear oblong obtuse. Anther with four triangular broad spurs. Capsule globose pustulate orange.

Perak: Ipoh (Curtis 3141), Bujong Malacca (Ridley 9819). Endemic.

13. Gl. VARIABILIS, Ridl. Trans. Linn. Soc. Vol. III. p. 378. Journ. Roy. As. Soc. S. Br. l.c. 98. Stem over a foot tall. Leaves ovate or ovate lanceolate acuminate 4 inches long 1½ inch broad glabrous dark green above purplish beneath. Panicles 4-5 inches long rather compact, branches short. Bracts ⅜ inch long oblong orange or scarlet persistent. Calyx straight lobes acute orange. Corolla tube more than twice as long, lobes oblong, upper one boat-shaped. Staminodes lanceolate oblong shorter. Lip cuneate oblong bilobed ¼ inch long, orange with a chesnut spot. Filament ¾ inch long. Anther with 4 acute spurs, the upper ones longest. Capsule sub-globose wrinkled.

Johore: Gunong Panti, Gunong Pulai (Ridley); Selangor: Bukit Kutu (Ridley); Pahang: Tahan River and Kota Glanggi (Ridley); Perak: Larut Hills (King's Coll. 2051). Distrib. Lingga, Borneo.

14. G. CERNUA, Baker, Fl. Brit. Ind. VI. 205. Stems tufted about a foot tall, bases purple. Leaves ovate acuminate cuspidate dark shining green above paler beneath 4 inches long 1½ inch broad, petiole ¼ inch long or less, ligule short truncate, sheath and midrib pubescent. Panicle short nodding 6 inches long, rachis pubescent, base nude except for about 6 lanceolate acute to oblong bracts ½ inch long or less. Flowers sessile clustered at the ends of the branches, lemon yellow. Bracts ovate yellow. Calyx tubular ¼ inch long, lobes equal short blunt. Corolla tube ¾ inch long slender pubescent, lobes ovate boat-shaped ¼ inch long. Staminodes linear oblong rather longer. Lip short oblong dilated towards the tip bilobed, lobes spreading acute ¼ inch long, yellow with a green spot. Anther spurs 4, upper ones subulate, lower ones broader. Capsule green wrinkled. Ridley l.c. 99.

Perak: Larut Hills (Ridley), Goping (King's Coll. 757); Selangor Ginting Bidai (Ridley), Tomoh (Machado). Endēmic.

15. G. BRACHYCARPA, Baker, l.c.c. Stem 15 inches slender Leaves ovate acuminate glabrous above, minutely pubescent beneath, sheaths hairy, ligule very short glabrous. Panicle short nodding with a few distant short branches, ⅛ inch long. Lower bracts ovate lanceolate ¼ inch long green persistent. Flowers pale yellow 4 or 5 crowded at the end of the branches. Calyx funnel-shaped entire ⅛ inch long. Corolla lobes ovate. Lip linear entire with a dark central spot. Anther with 4 equal triangular spurs. Capsule globose pustular. Ridley l.c. 99.

Perak: Larut Hills 2-3000 feet alt. (King's Coll. 2414; Curtis 2073, Ridley 2956). Endemic.

16. G. UNIFOLIA, Ridley, Journ. Roy. As. Soc. Str. Br., Vol. XLIV. p. 193. Rhizome creeping and throwing up stems 2 inches

apart. Stems 4-6 inches tall covered with pubescent sheaths ½ to 1 inch long. Leaf solitary erect ovate acute glabrous 6-8 inches long 3 inches wide narrowed to a petiole ½ to 1 inch long. Panicle dense decurved from the leaf-axil 2 inches long pubescent. Bracts oblong ovate pubescent ½ inch long. Calyx funnel-shaped ⅛ inch long teeth very obscure unequally bilobed pubescent. Corolla tube twice as long lobes oblong hooded, staminodes similar. Lip very short subspathulate bilobed tips rounded. Filament nearly ¾ inch long, anther spurs 4 linear acuminate acute the upper ones larger than the lower ones.

Tringanu at Bunâi (E. Rostado).

G. marantina, L. Mant. II. 170, Fl. Ind. i. 78. A short usually tufted plant with persistent ovate bracts, the flowers almost always replaced by bulbils occurs occasionally in or round gardens introduced from Java.

Singapore: Botanic Gardens; Penang: Ayer Hitam (Birch, Curtis 3729).

Excluded Species.

G. versicolor, Smith, Exot. Bot. t. 117. Malay Peninsula from Pegu to Singapore, Roxburgh, and Penang (Flor. Brit. Ind. VI. 205). I have seen no specimens of from our regions, Koenig collected it in Junk Ceylon in Siam, and says he saw it in a dwarf state near Malacca. This latter was doubtless *G. panicoides*, Miq., or some other common species mistaken for it.

2. Hedychium, Koen.

Herbs epiphytic or terrestrial, rhizomatous. Stems elongate. Leaves oblong or lanceolate. Inflorescence terminal. Bracts oblong or lanceolate subcoriaceous. Flowers 1 or more to each bract. Calyx tubular 3 toothed. Corolla tube long slender lobes linear, spreading or reflexed. Staminodes linear. Filament slender long connective not produced. Lip large bifid. Ovary 3 celled, many ovuled. Style long filiform stigma small. Capsule globose, three valved seeds many small with a coloured aril.

Species about 40. Indo Malayan.

Plants terrestrial roots fibrous.

Flowers spicate, lip broad bilobed ... 1. *H. collinum.*

Epiphytic roots thick fleshy.

Rhizome short, flowers scarlet ... ... 2. *H. longicornutum.*

Rhizome long very thick, flowers white 3. *H. macrorrhizum.*

1. H. collinum, Ridl. l.c. 103. A low tufted plant about 3 feet tall. Leaves broad lanceolate acuminate cuspidate glabrous 6 inches long, 3 inches wide ligule oblong 1 inch long ½ inch wide spike rather lax nodding 6 inches long. Bracts oblong truncate obtuse about 20 on a

spike 1½ inch long ½ inch wide. Flowers white in pairs in each bract. Calyx slender cylindric 1½ inch long. Corolla twice as long lobes linear narrow. Staminodes broader linear 1¼ inch long. Lip cuneate bilobed lobes divaricate tapering shorter than the staminodes. Filament very slender red twice as long as the lip. Anther very small reniform, basal points incurved.

Kedah, Gunong Jerai at 400 feet elevation rare (Ridley). Endemic.

2. H. LONGICORNUTUM, Bak. Fl. Frit. Ind. VI. p. 228. An epiphyte with very short rhizome and large thick fleshy roots clasping the stem of a tree. Stems several two feet tall. Leaves oblong acuminate glabrous, margins hairy dark green, 12 inches long 4 inches wide, ligule oblong lanceate 2 inches long sheath hairy, spike terminal 4 inches long dense. Lower bracts ovate upper ones narrower lanceolate 1 inch long or more covered with brown silky hairs. Calyx spathaceous oblique 1 inch long pink. Corolla tube cylindric lobes narrowly linear deflexed red 3 inches long ⅛ inch wide. Staminodes and lip similar linear undulate orange, 1⅛ inch long ¼ inch wide. Filament 5 inches long base stout tapering upwards pinkish white. Anther linear orange ⅛ inch long. Capsule oblong angles rounded dark brown hairy, orange inside, seeds 16 in each oblong angled aril crimson lacerate. Ridl. l.c.c. p. 100. *H. crassifolium*, Bak. l.c.c.

Johor: Castlewood (Ridley); Muar (Feilding); Malacca: Ayer Panas, Ophir woods (Ridley); Selangor: Ginting Bidai (Ridley 7791); Perak: Larut Hills, Ulu Bubong (King's Coll. 10174), Tomoh (Machado). Distrib. Sumatra.

A most beautiful plant scattered over nearly the whole Peninsula. Epiphytic low down on branches of trees to which it clings with its thick mass of fleshy grey roots. Native name "Tepus Lada" and "Ubat Chaching," the roots used in cases of earache and as a vermifuge.

3. H. MACRORRHIZUM, Ridley l.c. 102. Epiphytic, rhizome branched thick forming large clumps, roots thick terete. Stems 12 inches tall ¼ inch through. Leaves lanceolate acute glabrous 8 inches long, 2 inches wide base cuneate, petiole short, ligule short blunt. Spike nodding lax 10 inches long. Bracts oblong obtuse 1 inch long ½ inch wide, about 12 distant green bases hairy. Flowers 2 or 3 in each bract white. Calyx pubescent 1 inch long, teeth very short 2. Corolla tube very slender 1½ inch long, lobes very narrow linear 1 inch long. Staminodes similar. Lip narrow deeply bifid, lobes lanceate curved ¾ inch long. Filament slender 1½ inch long. Anther linear very narrow. Style shorter.

Selangor: Pahang Tract 15th mile (Ridley 8477) on a very lofty tree. Endemic.

3. Odontychium, Schum.

A terrestrial plant with numerous stems from a rhizome. Leaves linear lanceolate, panicle terminal lax with short three-flowered branches. Bracts spathaceous cup-shaped. Calyx tubular brown papery unequally bilobed. Corolla tube cylindric, upper lobe linear hooded, lower ones linear spathulate adnate to the base of the lip. Lip linear tip three-lobed, lobes toothed. Staminodes linear. Stamen twice as long as upper petal Anther oblong, ovary trilocular. Capsule globose, termiated by the calyx tube.

O. denticulatum, Schum. Pflanzen reich. Zingiberaceae, p. 59. A terrestrial plant forming large clumps stems 2 feet tall, leaves lanceolate acuminate glabrous with small thorn-like processes along the edge 8 inches long or more 3 inches wide petiole ½ inch long sheath hispid. Panicle a foot long branches short 3 flowered. Bracts 1 inch long. Calyx brown papery ½ inch long. Corolla tube straight, upper lobe narrow tip hooded pinkish, base green 1¾ inch long, laterals deflexed greenish narrow linear ending in three toothed lobes, the middle lobe bifid green, the base channelled red. Staminode little shorter than the petals red, stamen white pubescent. *Hedychium denticulatum*, Ridl. l.c. 102. Dindings, woods at Lumut, fl. July (Ridley 7822. 9453).

Excluded Species.

H. coronarium, Koen. "Malacca" in Fl. Brit. Ind. VI. 226, is not a native of the Peninsula. It is sometimes to be seen in gardens, and is called "Ganda suli."

4. Camptandra, Ridl.

Herbaceous glabrous plants, rhizome very short. Stems 1 or few. Leaves few ovate petiolate. Flowers several enclosed in a terminal green spathe, showy fugacious. Calyx tubular with 3 equal lobes. Corolla tube long slender lobes lanceolate or oblong. Lip obovate bilobed. Staminodes large obovate petaloid. Stamen shortly projecting, beyond the tube. Anther long slender curved dorsifixed versatile, the base prolonged into two parallel processes, the upper part only polliniferous, style slender, stigma capitate. Capsule oblong, seeds numerous, curved fusiform aril lacerate.

Species 4 Malay Peninsula and Borneo.

Stems several short, leaves 4 or 5 ovate	1. *C. parvula.*
Stems 1 or 2, tall. Leaves few large cordate	2. *C. latifolia.*
Stems 1 or 2, tall, ovate peltate	3. *C. ovata.*

1. C. parvula, Ridl. l.c. 104. Stems several about 6 inches tall. Leaves 4 or 5 ovate acuminate oblique, 2-3 inches long, 1 inch wide, petiole slender 1 inch. Spathe ovate acute 1 inch long. Flowers

white 1 inch across. Calyx ½ inch long, lobes very short. Corolla tube ½ inch long lobes oblong truncate mucronate. Lip oblong orbicular bilobed crenulate with a central orange spot, and some pink marks. Staminodes sub-spathulate crenulate ½ inch long. Anther crescent-shaped. Capsule ½ inch long.

Kaempferia parvula, Bak. l.c. 233.

Selangor; Bukit Kutu (Ridley); Pahang: Tahan River (Ridley 2406); Perak: Larut Hills (Curtis 2075), Bujong Malacca (Ridley 9573), Goping (King's Coll. 823), Tomoh (Machado); Penang: Government Hill; Tringanu: Bundi (Rostados). Endemic, on rocks and banks from 2000 to 4000 feet alt. common.

2. C. LATIFOLIA, Ridl. l.c. 105. Stem usually solitary succulent swollen at base. Leaves 1 to 4 cordate acuminate 5 inches long 2 inches across dark green, petiole 1 inch long purple. Spathe ovate green 1½ inch long. Flowers several 1 inch across white or violet. Calyx tubular red spotted. Corolla tube 1½ inch long white, lobes lanceolate obtuse. Lip orbicular bilobed 1½ inch across white or violet, with yellow basal ridges. Staminodes oblong obovate rounded. Anther long narrow curved. Capsule ½ inch long.

Perak: Bujong Malacca (Curtis 3315, Ridley 9523), Kinta (King's Coll. 7129). Hill woods. Endemic.

3. C. OVATA, n.sp. Stems solitary 3 to 6 inches tall, the base covered with oblong lanceolate sheathes 1 or 2 inches long, cuspidate. Leaves 2-3 ovate peltate acuminate inaequilateral, base rounded, 1½ to 3½ inches long, ¾ to 2 inches wide, petiole slender 1 to 1½ inches long sheath less than half as long. Peduncle ½ to 1 inch long sub-terminal erect. Bract ½ to 1 inch long, urn-shaped with a recurved tip, orbicular when spread out, and an inch across. Flowers 2 or 3, nearly sessile. Calyx tubular dilated upwards shortly three lobed, lobes blunt ⅛ inch long. Corolla tube slightly longer than the bract lobes pale blue or white ¼ inch long blunt. Capsule oblong ⅜ inch long, grey, thin walled punctate and blotched with brown. Seeds several fusiform obtuse dark grey with a thin white fimbriate aril.

Selangor: Hulu Semangkok at about 4000 feet elevation. (Burn-Murdoch, Ridley). Flowering in February and August. Allied to *C. latifolia* but much smaller.

5. KAEMPFERIA, L.

Herbs, rhizome tuberous aromatic, stem short or produced. Leaves thin. Inflorescence spicate very shortly pedunculate, with a few thin lanceolate bracts. Flowers fugacious thin showy, white or violet. Calyx short cylindric. Corolla tube slender lobes narrow linear. Staminodes very large rounded clawed spreading. Lip similar bilobed. Stamen thin flat short not exserted. Anther linear thin not or hardly exserted. Capsule oblong thin walled.

Species about 20. India, Burmah and Siam, a few Malayan. Several species cultivated for their rhizomes occur in and about gardens all over the East.

§ 1. SINCORUS, stem very short, flowers appearing with the leaves.

Leaves ovate, petiole short ... ... 1. *K. pulchra.*
Leaves oblong or lanceolate, petiole long 2. *K. elegans.*

1. K. PULCHRA, Ridl. l.c. 107. Leaves 2 ovate blunt spreading flat, 7 inches long 5 inches across dark olivaceous black with grey markings. Spike from between the leaves sub-cylindric 1 inch long covered with persistent convolute bracts, outer one brown ribbed, inner about 20 thin lanceolate, peduncle 3 inches long. Calyx tubular very thin. Corolla tube 1 inch, lobes linear obtuse $\frac{1}{2}$ inch long white. Staminodes connate with the lip obtuse mauve. Lip deeply bilobed lobes oblong rounded $\frac{1}{2}$ inch long mauve base yellowish white. Filament very short. Anther oblong crest very long linear apex rounded recurved.

Lankawi Islands (Curtis 2605). Distrib. Siam.

2. K. ELEGANS, Wall. Cat. 6593. Rhizome short creeping. Stems about 6 inches tall. Leaves 2 petiole and sheath about as long, blade 5 inches long 3 inches wide lanceolate ovate blunt deep velvety olive green. Peduncle $1\frac{1}{2}$ inch long slender spike narrow 1-$1\frac{1}{2}$ inch long. Bracts green, or mottled red. Calyx spathaceous limb long linear truncate 3 toothed. Corolla tube $1\frac{1}{2}$ inch long slender, lobes linear acute white. Lip deeply bilobed lobes rounded violet. Staminodes ovate clawed, violet base yellowish. Filament thin linear. Anther crest ovate entire recurved. Baker, Fl. Brit. Ind. VI. 222.

Monolophus elegans, Wall. Pl. Ar. Rar. I. 24 t. 27. Horan. Prodr. 22.

Lankawi (Curtis 2637). Distrib. Pegu, Tenasserim.

K. Galanga, L. Sp. Pl. 3. Hort. Cliff 3. Rootstock tuberous. Leaves suborbicular, subsessile green, 3-6 inches long spreading flat on the ground. Flowers white, about 1 inch across. Occurs in and round gardens where it is occasionally cultivated. The aromatic root is used in medicine and as a spice. Native name "Chekur," Native of India.

§ 2. PROTANTHIUM.

K. rotunda, L. sp. 3. with a thick aromatic rhizome and erect oblong or lanceolate leaves a foot long or more marbled and variegated dark green and grey purple beneath, flower scape short thick appearing after the leaves with large lilac flowers, also occasionally occurs as an escape from cultivation.

6. Gastrochilus, Wall.

Small herbs with a short or elongate rhizome. Stems short or long or none. Leaves lanceolate or ovate petioled, solitary or in tufts of 2-4. Spike axillary or from the rhizome. Bracts large or moderate sized. Flowers thin opening singly white yellow or red. Bracteoles solitary thin, Calyx tubular spathaceous short. Corolla tube long and slender, lobes oblong or lanceolate. Staminodes similar usually larger. Lip oblong or obcuneate often saccate, or convolute, entire or more or less lobed. Stamen filament thick and fleshy exsert. Anther oblong, crest small rounded or lobed, sometimes absent.

Species about 30. Indo Malayan or Siamese.

§ 1. Acranthi. Stems tall and leafy, spikes axillary in the upper leaves. Lip saccate.

Petioles 2 inches long ... ... 1. *G. albo-sanguinea.*
Petioles short ... ... 2. *G. pulcherrima.*

§ 2. Mesanthi. Stemless. Leaves 2-4 in a tuft. Spikes from between them.

Leaves several distichous large tufted plant
Bracts glabrous ... ... 3. *G. plicata.*
Bracts woolly ... ... 4. *G. Klossii.*
Leaves in pairs on a slender rhizome. Bracts narrow ligulate or linear.
Spike elongate. Bracts ligulate spiral... 5. *G. scaphochlymas.*
Spike elongate. Bracts oblong cuspidate 6. *G. lancifolius.*
Spike sessile, short. Bracts linear ... 7. *G. lanceolata.*
Leaves several together rhizome short. Bracts long and narrow crowded.
Spike short.
Leaves glabrous, petiole short. Flowers yellow ... ... 8. *G. minor.*
Leaves glabrous, petiole as long as the blade anther crestless ... ... 9. *G. longiflora.*
Petiole longer than blade. Anther crested ... ... 10. *G. longipes.*
Spike elongate. Bracts imbricate.
Spike 3 inches long, lip large convolute 11. *G. lurida.*
Spike 6 inches long. Lip orbicular ... 12. *G. tillandsoides.*
Leaves pubescent on the back.
Spike elongate. Bracts imbricate ... 13. *G. Prainiana.*
Spike short. Bracts not imbricate.
Corolla lobes oblong lanceolate... ... 14. *G. Curtisii.*
Corolla lobes linear ... ... 15. *G. clivalis.*

§ 3. EXANTHI. Spike rising directly from the rhizome. Leaves solitary distant.

Leaf ovate oblong base rounded petiole short.

Bracts narrow ½ inch long ... ... 16. *G. biloba.*

Bracts broad 1 inch long ... ... 17. *G. oculata.*

Leaf lanceolate cordate, petiole long ... 18. *G. concinna.*

§ 1. ACRANTHI.

1. G. ALBO-SANGUINEA, Ridl. l.c. 111. Whole plant 12 to 18 inches tall, stem leafy. Leaves about 6, oblong lanceolate acuminate base broad rounded, 8 inches long, 2½ across, petiole slender 2 inches long, sheaths about 6 inches. Spike central shorter than the leaves about 5 inches long. Bracts lanceolate acute closely appressed. Calyx spathaceous truncate ¼ inch long. Corolla tube 1 inch long, lobes linear incurved white. Staminodes porrect oblong obtuse white tinted pink. Lip saccate white margin red everted ¾ inch long. Filament moderately broad flattened. Anther linear ½ inch long, no crest.

Perak: Larut Hills (Woolridge) fl. in H. B.; Penang: September, Lankawi (Curtis). Endemic.

2. G. PULCHERRIMA, Wall. Pl. As. Rar. i. 22. Stems 6 to 12 inches tall. Leaves oblong caudate sessile or shortly petiole 4 to 6 inches long, 2-2½ inches wide. Spike axillary, 2-3 inches long. Bracts imbricate oblong lanceolate green 1½ inch long. Calyx spathaceous half the length of the corolla tube. Corolla tube curved rather thick, lobes linear oblong ½ inch white. Staminodes as long white broader. Lip obovate cuneate saccate 1 inch long white tipped crimson. Stamen filament short thick. Anther longer broad crestless. Paxt. Mag. Bot. VII. 75, Bot. Mag. t. 3930, Horan. Prodr. 22, Bak. Fl. Brit. Ind. VI. 217.

Penang (Maingay). Distrib. Burmah, Borneo.

§ 2. MESANTHI.

3. G. PLICATA, Ridl. Journ. Roy. As. Soc. S. Br. XXXIV, 196. A large tufted plant distichous leaves, sheaths 3 inches long split with a broad thin margin, petiole stout 4-5 inches long, blade ovate acute 12 inches long, 6 inches wide light green above plicate, spike shorter than the petiole covered with subdistichous sheaths with small ovate green laminas at the top. Flowers opening singly. Corolla tube 1 inch long white, lobes narrow linear acute ½ inch long. Staminodes subspathulate obtuse rounded 1 inch long ½ inch wide light yellow. Lip 1 inch long oblong obtuse with upcurved sides; tip rounded entire, yellow with a cherry red band at the base and a similarly colored blotch at the

tip, or a broad band for the whole length of tip. Stamen shorter white, crest none.

Kelantan, Kwala Lebir (Dr. Gimlette).

4. G. KLOSSII, n.sp. Rhizome long with strong roots. Leaves numerous subdistichous, petiole 7 inches long slender sheathing for about half its length, blade oblanceolate narrowed cuneate at the base subacute inaequilateral 9 inches long 3 inches across glabrous, spikes cylindrical 3 inches long 1 inch wide on short peduncles $\frac{1}{2}$ inch long. Bracts lanceolate acute woolly pubescent. Bracteole lanceolate acuminate $\frac{3}{4}$ inch long strongly ribbed enclosing two flowers. Floral bracteole strongly ribbed. Corolla pubescent. Anther linear crest ovoid rounded entire. Ovary three angled.

Johor: near Gunong Pulai (C. B. Kloss). Unfortunately the flowers of this plant were quite rotten.

5. G. SCAPHOCHLAMYAS, Ridl. l.c. 112. Rhizome long creeping. Leaves in tufts of 2 or 3 with a few sheathing ones at the base lanceolate inaequilateral acute or blunt dark green, 6-7 inches long $1\frac{1}{2}$ inch wide pubescent petiole 3-4 inches pubescent. Scape central 5 to 9 inches long pubescent. Bracts spiral ligulate blunt green with red sheaths pubescent 1 inch long $\frac{1}{2}$ inch wide. Flowers white, fragrant. Corolla tube 1 inch long, lobes oblong lanceolate $\frac{1}{2}$ inch long. Staminodes similar. Lip obovate undulate bilobed with a central yellow bar. Stamen broad, anther cells narrow crest orbicular very large. Style shorter.

Scaphochlamys Malaccana, Bak. Fl. Brit. Ind. p. 252. *Kaempferia Malaccana*, Pflazen, Schum. p. 81, *Cumingii* Schum. l.c. 80.

Malacca: woods on Mount Ophir (Cuming 2356), (Griffith 5761), (Maingay 1579), (Ridley 3141), Bukit Muar (Feilding). Endemic.

6. G. LANCIFOLIUS, Ridl. l.c.c. Rhizome slender. Leaves in pairs lanceolate acuminate acute inaequilaterial 7-8 inches long, 2 inches wide petiole 5 inches. Spike central 3 inches flexuous. Bracts 5-6 oblong cuspidate distant $\frac{1}{2}$-1 inch long. Flowers rather small yellow 3 to a bract. Calyx $\frac{3}{4}$ inch long. Corolla tube 1 inch, lobes linear $\frac{1}{4}$ inch. Lip half an inch bilobed rounded. Staminodes oblong rounded as long and broader than petals. Anther cells parallel linear, crest broader cuneate 3 lobed.

Johore, Kwala Sembrong (Kelsall). Endemic.

7. G. LANCEOLATA, n.sp. Rhizome woody rather slender. Leaves in pairs light green barred with white, lanceolate oblique narrowed at base, tip blunt, rather stiff 4 inches long, 9 inches wide glabrous, petiole $1\frac{1}{4}$ inch long. Spike as long as the petiole nearly sessile obconic. Bracts linear lanceolate subacute narrow $\frac{3}{4}$ inch long. Flowers white. Bracteole $\frac{3}{4}$ inch long lanceolate. Calyx spathaceous

obtuse. Corolla tube 1 inch long slender lobes lanceolate ¼ inch long acute. Staminodes narrower. Lip obcuneate ½ inch long. Anther crest large broad, apex truncate. Filament rather long linar.

Johor, Gunong Pantai, in forests (Ridley). Endemic.

8. G. MINOR, Bak. Fl. Brit. Ind. VI. 217. Rhizome very short. Leave about 4 in a tuft, oblanceolate obtuse 4 inches long 1¼ across dark green with a median silvery bar, petiole 1 inch long, sheaths red, Spike short from the centre of the leaf tuft. Bracts yellowish. Flowers large, 1 inch across. Calyx tubular. Corolla tube not longer than the bract, lobes oblong obtuse yellow. Staminodes oblong obtuse yellow with red spots at the base. Lip an inch long ½ inch wide flat oblong obtuse with a central keel running the whole length and bifurcating at the tip, yellow with crimson spots at the base. Stamen long pink filament linear thick arched. Anther broader crest rounded obscurely 3-lobed. Ridley l.c. 111.

Perak: Batang Padang (Curtis), Bujong Malacca (Ridley), Larut (King's Coll.), Bukit Kapayung (Ridley). Endemic.

9. G. LONGIFLORA, Wall. Pl. As. Rar. i. 22, t. 25. Leaves about 4 in a tuft, petiole long blade 6-12 inches or more long base cordate or cuneate glabrous. Spike short. Bracts several oblong lanceolate imbricate about 2 inches long. Calyx tubular with 3 points. Corolla tube slender 2-3 inches long lobes ½-1 inch long white. oblong blunt. Staminodes longer obovate. Lip longer oblong cuneate margins incurved white tinted with purple or tipped deep red. Filament short. Anther broad. Style shorter. Hook. Bot. Mag. t. 4010, Horan. Prodr. 22, Baker Fl. Brit. Ind. VI. 217.

Perak (Curtis, cult. in H. B. Penang); Malacca (fide Baker l.c.). Distrib. India.

10. G. LONGIPES, King and Prain. Mss. Ridl. l.c. 113. Rhizome far creeping. Leaves 2 elliptic ovate subacute glabrous 8 inches long 4 inches wide, petiole 9 inches sheathing for ⅓ of its length. Spike central 2 inches. Bracts narrow lanceolate few and long. Corolla tube long, lobes lanceolate half as long as the lip. Lip entire oblong rounded at the tip edges crisped and thickened ¼ inch long central bar much thickened. Staminodes broader than corolla lobes and longer than the lip. Filament rather slender. Anther oblong, crest larger oblong rounded. Style much longer. Stigma broadly obconic.

Perak, Larut, Briah (Wray 4220). Endemic.

11. G. LURIDA, n.sp. Leaves two or more in a tuft, ovate lanceolate undulate glabrous 6 inches long 1½-2½ inch wide, petiole 4½ inches long, sheathing for 2 inches. Spike nearly sessile 3 inches long flat acuminate deep purple. Bracts lanceolate acuminate 1½-2 inches long. Flowers large. Calyx thin spathaceous ½ inch. Corolla tube thick 1½

inch long, lobes oblong obtuse $\frac{3}{4}$ inch long pinkish. Staminodes very large obovate retuse $\frac{1}{2}$ inch across. Lip convolute 1 inch long, apex broad rounded dark pink broad. Filament bent pubescent rather long. Anther oblong broad crestless.

Lankawi (Curtis).

12. G. TILLANDSIOIDES, Bak. Fl. Brit. Ind. VI. 218. Leaves oblong subacute base rounded green above purplish beneath 6 to 8 inches long, petiole nearly or quite as long. Spike 6 inches long subsessile. Bracts oblong 20 to 30 imbricate 1 inch long. Calyx and corolla not described. Staminodes $\frac{1}{4}$ to $\frac{1}{3}$ inch long white linear oblong similar to the corolla segments. Lip orbicular cuneate $\frac{1}{2}$ inch long and broad pure white a faint yellow spot at the throat. Stamen half as long as the lip.

Perak (Kunstler cult. in Hort. Bot. Calcutta). Endemic.

13. G. PRAINIANA, Ridl. l.c. 115. *Kaempferia Prainiana*, Baker, Fl. Brit. Ind. VI. 220.

Leaves about 4 in a tuft, lanceolate acute 8 inches long $1\frac{1}{2}$ inch wide back pubescent, petiole as long. Spike rising directly from the rhizome long slender 6 inches tall, sessile. Bracts numerous oblong imbricate membranous. Corolla tube slender 1 inch long, lobe oblong ascending white, under $\frac{1}{2}$ inch long. Lip oblong cuneate much longer.

Perak, Goping (King's Coll. 226).

A plant closely resembling this if not identical, was collected by Curtis in Indragiri, Sumatra. It is however smaller in all its parts. The corolla lobes oblong obtuse $\frac{1}{4}$ inch long. Staminodes similar. Lip boat-shaped as long white with red blotches down the centre. Anther linear with no crest.

14. G. CURTISII, Baker, Bot. Mag. t. 7363. Leaves 4 in a tuft, ovate oblong acute 5-12 inches long 2 to 6 wide, back pubescent petiole stout 6 inches long, sheath purplish 2 inches. Spike central about an inch long. Bracts oblong white 1 inch long. Calyx cylindric as long, lobes oblong lanceolate, pubescent. Corolla tube 2 inches long cylindric, lobes oblong lanceolate 1 inch long. Staminodes a little longer all white. Lip longer oblong obtuse flat yellowish cream with red marks on the sides. Filament cylindric pubescent. Anther short and thick, crest short broad truncate. Style longer. Ridley l.c. 113.

Lankawi on limestone rocks (Curtis 2896, 2678, 1675). Endemic.

This appears to be very variable in colouring, sometimes the lip has lateral red blotches at others they are absent, another form had deep purple blotches on the staminodes.

15. G. CLIVALIS, Ridley, l.c. 114. Rhizome rather slender with long roots. Leaves 3 or 4 in a tuft ovate to lanceolate acute narrowed

at the base into the petiole, inaequilateral 4½ to 8 inches long, 2 inches wide, petiole 5 or 6 inches long sheathing for about 3 inches all glabrous except about the midrib on the back, where are a few scattered hairs. Spike central 3 inches long. Bracts long and narrow containing 4 or 5 flowers with 2 long narrow linear acute, bracteoles 1 inch long ½ inch wide. Calyx tube very narrow ½ inch long, lobes lanceolate 2 longer than the third. Corolla tube slender 2 inches long, lobes linear ½ inch long. Lip oblong entire apex rounded crisped, median bar thickened. Staminodes as long as corolla lobes broader blunt. Filament rather slender. Anther oblong, crest oval, longer than the stigma.

Selangor: Pahang Track on banks (Ridley). Endemic.

G. PANDURATA, Ridl. l.c. 114. *Kaempferia pandurata*, Roxb. As. Res. XI. 320, t. 2, Bot. Reg. t. 173, Rosc. Scit. Pl. t. 96.

Cultivated by the Malays and Chinese for its aromatic root-stock, and occasionally found in abandoned gardens belongs to this section. It is probably a native of India and is called "Temu Kinchi" by the Malays. The rhizome is yellow inside, and bears a tuft of about 5 oblong ovate leaves with a broad base and long petiole. The spike is short. The flowers white or pink. Lip saccate white spotted pink.

§ 3. EXANTHI.

16. G. BILOBA, Ridl. Trans. Linn. Soc. III. p. 379. Rhizome rather long slender. Leaves solitary distant obovate subcoriaceous 6 inches long 4 inches across, deep bluish green above with a white feather on each side, bright rosy pink beneath, petiole 2 inches long or more stout. Spike close to the leaf and enclosed with it in a red sheath as long as the petiole or shorter, peduncle 1 inch long. Bracts narrow lanceolate blunt red ¾ inch long. Flowers white 6 or more enclosed in red bracteoles. Calyx tubular very short. Corolla tube 1 inch long lobes lanceolate acute ¾ inch long. Staminodes much shorter oblong obtuse rounded. Lip obovate apex bilobed white pale yellow in the centre. Stamen short. Anther oblong pubescent, crest broader rounded retuse.

G. calophylla, Ridl. Journ. Roy. As. Soc. S. Br. Vol. XXXII. p. 115.

Selangor: Pahang Track in dense forest (Ridley); Pahang: Tahan River (Ridley). Endemic.

The Pahang plant has a deeper bilobed lip, and the leaves less distinctly marked with white and has a few other slight differences but I think the two are specifically the same.

17. G. OCULATA, Ridl. l.c. 117. Rhizome rather long creeping. Leaf solitary ovate glabrous 8 inches long by 4½ inches wide dark green purplish beneath prominent nerves about 14, petiole 10 inches longer less. Peduncle 1 inch long enclosed with the petiole in a sheath.

Spike 1½ inch long. Bracts ovate to lanceolate ½ an inch long red, lower ones blunt, upper ones acute. Flowers 2 to a bract. Calyx ½ inch long, lobes 2 very short. Corolla tube 1 inch long, lobes lanceolate acute ¾ inch long. Staminodes oblong lanceolate obtuse broader pubescent ½ inch long white. Lip obovate bilobed ½ inch long and as wide white centre yellow and 2 deep crimson patches at the base. Filament short and broad. Anther pubescent crest very short rounded.

Selangor : Pahang Track at 1500 feet alt. (Ridley 8484) ; Johore : Gunong Janeng (Kelsall) ; Pahang : Selinsing (Machado). Endemic.

18. G. CONCINNA, Ridl. l.c. 116. Rhizome slender, Leaf solitary lanceolate acuminate with a broad cordate base 6 inches long one and a half glabrous, petiole very long and slender 9 inches tall. Peduncle an inch long enclosed with the base of the petiole in two sheaths. Bracts lanceolate acute rather thin red an inch long. Calyx very short. Corolla tube longer than the bracts gradually dilated upwards white with dark red stripes. Lip oblong margin incurved. Anther crest small entire.

Kaempferia concinna, Baker, Fl. Brit. Ind. VI. 221.

Perak : Ulu Bubong (King's Coll. 10135). Endemic.

DOUBTFUL SPECIES.

G. sp. Rhizome rather stout. Leaves 3 or 4 unequal lanceolate to ovate lanceolate 8-12 inches long 4 to 6 inches across cuspidate closely nerved with fine cross bars, glabrous, petiole 6-8 inches long. Spike cylindric 6 inches long from among the leaves almost sessile. Bracts oblong 1½ inch long. Flowers not seen.

Johore, base of Gunong Panti in woods (Ridley).

This is a very distinct plant in the great size of its leaves, and long spike. I was quite unable to find flowers though the plant was abundant in one spot. It is allied to *G. Prainiana*, Ridl., and to *G. plicata*, Ridl.

7. CURCUMA, L.

Rhizome thick aromatic with tuberous roots or slender with fibrous roots, stems short or none. Leaves oblong or obovate usually tufted rarely solitary. Spikes peduncled, bracts ovate forming a cone, usually brightly coloured, uppermost ones often empty longer and of a different colour. Flowers fugitive several in each bract with several bracteoles. Calyx short cylindric toothed. Corolla tube broad funnel-shaped lobes ovate or oblong. Staminodes oblong petaloid. Lip orbicular or obovate. Filament short broad. Anther cells parallel, sometimes spurred at the base, crested or not. Ovary 3 celled ovules many. Style filiform. Capsule globose membranous 3 valved. Seeds usually arillate ovoid or oblong.

Species about 35. India, Siam, Malay Islands, Australia.

§ 1. ZEDOARIA. Rhizome thick aromatic. Spike often appearing without the leaves. Corolla tube short and thick. Anther versatile with long decurved points at base.

Spike large. Bracts green with pink tips in upper ones crimson ... ... 1. *C. zedoaria.*

§ 2. HITCHENIOPSIS. Rhizome rather slender. Spike from centre of the leaf tuft. Corolla tube slender. Filament slender. Anther linear, terminal. Chiefly differs from *Gastrochilus* in the form of the spike and bracts.

Leaves in pairs broad, peduncle short ... 2. *C. Kunstleri.*

Leaves 2-3 narrow lanceolate peduncle slender ... ... 3. *C. lanceolata.*

Leaf solitary, ovate peduncle long slender 4. *C. sylvestris.*

§ 1. ZEDOARIA.

1. C. ZEDOARIA, Roscoe Scitamineae t. 109. Rhizome large fleshy with oblong rounded tubers, orange coloured inside. Leaves in pairs lanceolate to cuspidate glabrous bright green with a central purple brown bar 18 inches long 6 inches wide. Scape outside the leaf tuft, peduncle 18 inches long, spike 6 inches or more long of about 20 bracts, lower ones green more or less tipped pink, upper ones lanceolate deep crimson. Flowers 4 to each bract. Bracteoles thin transparent 1 inch long lanceolate. Calyx $\frac{1}{4}$ inch long bifid hairy. Corolla tube 1 inch long funnel-shaped yellowish white lobes $\frac{1}{2}$ inch white. Staminodes oblong obtuse erect. Lip oblong obovate bilobed yellowish tip orange. Filament adnate to staminodes, short broad. Anther spurred.

Horan. Prodr. 23, Bak. Fl. Brit. Ind. VI. 210.

C. zerumbet, Roxb. As. Res. XI. 333, Fl. Ind. i. 20, Coromand. Pl. t. 101. *C. officinalis*, Salisb. Trans. Hort. Soc. i. 285. *C. speciosa*, Link. Enum. ii. 3. *Amonum zerumbeth*, Koen. Retobs. iii. 55. *A. latifolium*, Lam. Encyc. i. 134.

Singapore: Bukit Timah, etc., (Ridley); Penang: Balik Pulau (Curtis 1744) (Ridley 7229); Kedah: Yan (Ridley).

The "Temu Lawas" of the Malays, commonly cultivated has established itself in many places near abandoned cultivations. It is a native of India and probably also of the Malay Islands. Several other species such as the Tumeric "Kunyet" *Curcuma longa* L. and *C. aromatica*, Salisb. are cultivated by Malays and Chinese but do not seem to establish themselves.

§ 2. Hitcheniopsis.

2. C. Kunstleri, Baker, l.c. 214. Rhizome moderately stout. Leaves in pairs obovate cuspidate 12 inches long and 6 inches across, deep green above purple pubescent beneath, petiole 4 inches long thick. Spike from between the leaves 4 inches long on a short peduncle. Bracts few about 1 inch long, tips rounded deep red, inner bracts shorter oblong ovate cartilagineous deep red. Calyx half an inch long cylindric deeply split obscurely 3 fid red. Corolla tube 1 inch long white, lobes lanceolate acute $\frac{1}{2}$ inch long white. Staminodes oblong obtuse. Lip obovate obtuse denticulate bilobed yellow darkest in centre, with a few pink streaks at base. Stamen pubescent with a broad filament. Anther oblong emarginate no crest. Ridley l.c. 120.

Perak: Larut Hills (Curtis 2875, 2719), Wray 3702, 3662, 3388) Tapa (Wray 193); Dindings: Gunong Tungul (Ridley 7228).

var. *rubra*. Staminodes lip and anther dark red.

Perak, Kwala Dipang at the base of limestone cliffs (Ridley). Inhabits dense damp woods local but abundant. Endemic.

3. C. lanceolata, n.sp. Leaves 2 or 3 in a tuft lanceolate subacute 8 inches long $2\frac{1}{2}$ inches wide, dark green glabrous above with appressed hairs on the midrib beneath, petiole 6 inches long. Peduncle 3 inches long. Spike obconic. Bracts ovate lanceolate green acute $\frac{3}{4}$ inch long or less. Calyx tube $\frac{1}{4}$ inch long lobed. Corolla tube slender $\frac{1}{2}$ inch long, lobe oblong $\frac{1}{4}$ inch long. Staminodes much smaller, linear glandular pubescent. Lip oblong obtuse white apex yellowish, sides barred crimson. Filament half as long as the anther, glandular pubescent. Anther linear, crest small ovate.

Perak, Bujong Malacca (Curtis 2522). Endemic.

4. C. sylvestris, Ridley Trans. Linn. Soc. Vol. III. p. 378, Journ. Straits Branch Roy. As. Soc. Vol. 32, p. 121. Rhizome slender far creeping. Leaf solitary ovate acute 8 inches long by 4 inches wide green above purple beath glabrous, petiole slender 18 inches long. Peduncle 4-6 inches long enclosed at the base with the petiole in a large sheath. Spike obconic $1\frac{1}{2}$ inch long. Bracts broad ovate points recurved rosy. Flowers small white. Corolla tube slender $\frac{1}{2}$ inch long, lobes narrow linear acute $\frac{1}{2}$ inch long. Staminodes broader lorate obtuse. Lip oblong obovate emarginate lobes rounded, white with a median yellow spot and some violet streaks. Filament broad. Anther oblong with a broad recurved dark violet crest.

Pahang: Tahan Woods (Ridley 2400). Local but very abundant at one spot. Endemic.

Excluded Species.

C. grandiflora, Wall. Voight Hort. Suburb. Calc. 565, Bak. Fl. Brit. Ind. VI. 216. "Malay Peninsula." This is one of the Zedoaria

section and seems to be only known from a drawing in the Kew Herbarium. It is very improbable that it was obtained from the Malay Peninsula.

8. CONAMOMUM, Ridl.

Stout plants with a woody rhizome elevated above the ground on tall roots. Leafy stems tall. Leaves oblong lanceolate. Scapes from the rhizome peduncled, with a dense spike of flowers with stiff green or brown persistent bracts. Calyx tubular. Corolla tube short and thick, lobe unequal upper one largest oblong. Staminodes linear smaller. Lip 3 lobed or entire. Stamen short and broad. Anther with curved linear arms. Capsule subglobose or oblong.

Species 2, endemic.

Inner bract ovate. Calyx tubular	...	1. *C. citrinum.*
Inner bract utricular. Calyx utricular	...	2. *C. utriculosum.*

1. C. CITRINUM, Ridl. l.c. 121. Leaves oblong cuspidate base acute 12 inches or more long, 3 inches wide petiole short winged. Scapes several 13 inches tall peduncle stout 8 inches long, sheaths 2 inches long, spike very dense. Bracts light green ovate acute stiff ½ inch long. Bracteole broadly ovate. Calyx short tubular lobes 3 equal, ¼ inch long. Corolla tube short and thick lobes elliptic oblong obtuse white, upper one ½ inch long lower ones shorter. Staminodes short linear blunt pale red. Lip 3 lobed, lobes erect rounded, midlobe oblong obtuse rounded, ¼ inch across, yellow with pale red stripes on the side lobes. Stamen ½ inch, filament linear. Anther with 2 curved linear arms, yellow spotted red. Capsule globose ½ inch long purple.

Perak: Larut Hills (Ridley 2959), Bujong Malacca (Ridley 9788).

2. C. UTRICULOSUM, Ridl. l.c. 122. Rhizome very large raised high above the ground. Stems about 6 feet tall clubbed at the base. Leaves lanceolate or oblong lanceolate cuspidate base narrowed 16-18 inches long 2-4 inches wide, petiole 1 inch or less. Spike on a thick peduncle 6 inches long, covered with stiff truncate sheaths, inflorescence 6-18 inches tall. Outer bracts ovate acute 1 inch long. Bracteole utricular enclosing the flower 6 lobed and split nearly to base. Calyx utricular longer than the corolla tube, lobes 3 rounded obtuse. Corolla tube short and thick, lobes oblong obtuse, upper one larger. Lip as long claw broad blade fan-shaped buff with red veins. Staminodes linear flat tip rounded. Filament rather short thin. Anther cells thick, crest ovate rounded arms curved linear. Capsule fusiform 1 inch long.

Perak: Larut Hills (Curtis 2714, Ridley 5190), Gunong Batu Putih (Wray 1013.)

9. COSTUS, L.

Stems tall often spiral, sometimes branching. Leaves lanceolate shortly petioled, ligule forming a complete ring. Spike terminal or

basal. Bracts stiff often spiny. Calyx tubular with three lobes. Corolla tube broad funnel-shapped as long lobes large lanceolate or oblong. Lip large obovate usually entire trumpet-shaped. Staminodes absent. Stamen very broad and thin connective above long acute or curved up. Anther cells narrow linear. Capsule woody splitting on one side, seeds numerous angled.

Species about 40. South America, Africa and Indo Malaya.

Spike terminal flowers white	1. *C. speciosus.*
Spike on the rhizome.	
Bracts strongly spiny. Flowers red ...	2. *C. globosus.*
Bracts hairy not pungent. Flowers yellow	3. *C. Kingii.*
Bracts glabrous thin	4. *C. Kunstleri.*

1. C. SPECIOSUS, Smith Trans. Linn. Soc. i. 249. Stems 6 to 10 feet tall ½ to 1 inch through covered with dull brown sheaths, often branched above and spiral. Leaves oblong acuminate 9 inches long 3 inches wide above glabrous dark green, beneath more or less pubescent, petiole ¼ inch long pubescent, ligule short annular reddish. Spike ovate or oblong terminal (very rarely from the rhizome) 6 inches or less. Bracts ovate mucronate not pungent red ¾ inch long. Bracteole shorter lanceolate acute. Calyx short cartilagineous red, lobes very short, lower one longest. Corolla tube short hardly ¼ inch long lobes equal mucronate 2 inches long, white often tinged rose. Lip very large obovate convolute 4 inches long and wide white central bar yellow. Stamen 2 inches long filament hairy on the back ¼ inch across, crest oblong acuminate orange beneath. Capsule half inch long red. Seed 4 or 5 in each cell. Bak. Fl. Brit. Ind. 250, Roxb. As. Res. XI. 349, Fl. Ind. i. 58, Wight Ic. t. 2014, Rchb. Fl. Exot. t. 69, Paxt. Mag. IV. t. 245. *C. arabicus*, Jacq. Ic. t. 1, *Hellenia grandiflora*, Retz. Obs. VI. 68, *Banksia speciosa*, Koem. Retz. Obs. III. 75. Common over the whole peninsula.

var. *argyrophyllus*, Wall. Cat. 6555. Bak. l.c.c.

A more slender woodland form. Stems more branched, leaves more pubescent on the back often quite silky. Bracts and calyx less brightly coloured, often green. Flower spikes and flowers small. Lip entirely white. Petals often tinted pink.

Common in woods, Singapore, Malacca, Perak (King's Coll.436.) Very rarely indeed a spike of flowers appears rising directly from the rhizome.

Schumann Monogr. der Zingiberaceen von Malaisien (Engler's Bot. Jahrb. XXVII) makes 5 varieties one of which var. *sericea* is doubtless *argyrophyllus*, the rest are very slightly different forms.

The native name is "S'Tawar or Tawar," and the plant is chiefly used in magic ceremonies.

Distribution. India, Ceylon and Malay Archipelago.

2. C. GLOBOSUS, Bl. Enum. Pl. Jav. 62. Stems tall 6 to 8 feet rather slender bases covered with reddish brown sheaths. Leaves on one side of the stem only, sheaths terete 1 inch long blade broadly oblanceolate acuminate 7 inches long 2½ inches wide, midrib beneath sometimes pubescent petiole ¼ inch long, ligule annular ciliate. Spike from the rhizome on a peduncle 3 inches long, compact as long as the peduncle. Bracts broad ovate stiff red an inch long with a long sharp pungent mucro. Flowers cherry red. Bracteole resembling the bract but smaller. Calyx tubular with three pungent lobes, an inch long red. Corolla tube as long as the calyx, lobes lanceolate pubescent acute 1 inch long ½ inch wide. Lip obovate involute 2 inches long fringed with hairs. Filament ⅜ inch across. Anther crest ovate obtuse red, back of stamen covered with white wool. Bak. l.c. Ridl. l.c. 125. Valeton. Ic. Bogar. VII. 163.

C. acanthocephalus, Schum. Eng. Bot. Jahrb. XXVII. t. VI. D.

Singapore : Bukit Timah (Ridley) ; Johor : Gunong Panti ; Selangor : Kwala Lumpur Caves (Ridley 8474) ; Perak : Larut Hills ; Pahang : Tahan River (Ridley 2392) ; Sungei Ujong : Tampin (Goodenough 1908). Distrib. Sumatra, Java, Borneo. On rocks and banks in damp woods.

3. C. KINGII, Bak. Fl. Brit. Ind. VI. 250. Stems about 6 feet tall. Leaves oblanceolate oblong cuspidate 8 inches long 3 inches wide glabrous above softly pubescent beneath, sheaths hispid, ligule hardly distinct not hairy. Spike from the rhizome on a peduncle 2 inches long, conic cylindric 3 inches long, 2 inches through. Bracts ovate ¾ inch long, upper ones smaller lanceolate mucronate with a short hairy point. Bracteole similar but smaller. Flowers orange yellow. Calyx nearly an inch tubular, lobes 3 equal mucronate hairy. Corolla tube 6 inches long lobes oblong mucronate pubescent. Filament oblong rather short white woolly apex rounded orange. Ridley l.c. 125.

Penang : Pulau Betong (Curtis 1976) ; Perak : Larut Hills (King's Coll. 2104). Endemic.

4. C. KUNSTLERI, King. Mss. Leaves oblanceolate narrowed at the base apex acuminate cuspidate glabrous 6-7 inches long 2½ inch wide, petiole ¼ inch long, sheaths 1½ inch long glabrous dilate. Peduncle 3 inches long, rather slender. Capitulum 1½ inch long subglobose. Bracts thin lanceolate. Calyx tube little over ½ inch thick purplish, lobes 3 acute. Corolla tube ½ as long again rather slender lobes oblong over an inch long. Lip convolute obovate rounded 1½ inch long ½ inch across. Stamen flat thin appendage long linear broad. Stigma with a broad trilobed crest. Ovary hispid.

Perak : Larut Hills 500 to 1,000 feet (Kunstler 2037). Endemic.

This is remarkable for the thin narrow bracts and small flowers, and for the peculiar crested stigma which resembles that of some of the South American species.

10. ZINGIBER, Adans.

Rhizome short thick more or less aromatic. Stems leafy. Leaves lanceolate. Spike from the rhizome (rarely terminal) almost sessile or pedunculate, cylindric or conic, with large red or yellow bracts containing 1 or more flowers. Calyx tubular short. Corolla tube little longer than the bract, lobes oblong or lanceolate. Staminodes wanting. Lip 3 lobed, midlobe longer. Stamen filament linear. Anther cells linear, connective prolonged into a long terminal curved beak. Style as long. Capsule thin-walled splitting into 3 valves, seeds black angled covered with an aril.

Species, about 30. India, Siam, Malayan.

Spikes base broad, apex blunt.
- Leafy stems 4 to 7 feet tall.
  - Spikes cylindric large ... ... 1. *Z. spectabile.*
  - Spike short conic ... ... 2. *Z. Kunstleri.*
- Leafy stems about 2 feet.
  - Spikes obconic, bracts narrow ... ... 3. *Z. Wrayi.*
  - Spikes cylindric red. Lip midlobe entire 4. *Z. Zerumbet.*
  - Lip midlobe bifid ... ... 5. *Z. Cassumunaar.*
  - Spikes yellow cylindric blunt.
    - Lip pink, midlobe bifid ... ... 6. *Z. chrysostachys.*
    - Lip white midlobe entire ... ... 7. *Z. citrinum.*

Spikes fusiform narrowed at base apex acute.
- Lip midlobe acute deeply bifid ... 8 *Z. gracile.*
- Lip midlobe entire oblong blunt ... 9. *Z. puberula.*
- Lip midlobe entire lanceolate acute ... 10. *Z. Griffithii.*

1. Z. SPECTABILE, Griff. Notul. iii. 413. Stems 7 feet tall ½ inch through. Leaves about 25, lanceolate mucronate 12 inches long, 4 inches across dull green, ligule thin bilobed ¼ inch long. Peduncles stout 12 inches or more. Spike as long. Bracts stiff ovate edges recurved blunt, at first yellow, then scarlet. Calyx spathaceous subobtuse 1½ inch long white. Corolla tube 1½ inch long, lobes lanceolate acute 1½ inch long, lower ones connate for ½ the length and adnate to the lip, yellowish white. Lip 3 lobed shorter, side lobes broad rounded, median ovate bifid lemon yellow mottled black or deep purple. Anther broad yellow appendage long curved purple. Capsule an inch long. Bak. l.c. Ridley l.c. 128. *Z. macradenium*, Schum. Engl. Bot. Jahrb. XXVII, 269. Pflanzenr, 174.

Malacca: Panchor (Goodenough 1272); Negri Sembilan: Bukit Tampin (Goodenough 1877); Selangor: Pataling; Pahang: Kwala

Luit, Tahan (Ridley 2407); Perak: Larut (King's Coll. 3205); Dindings: Lumut (Ridley); Penang: Pulau Betong (Curtis 1978, 2161). Distrib. Sumatra.

A very fine and showy plant, occurs in damp forest.

2. Z. KUNSTLERI, King. Mss. Ridl. Journ. Roy. As. Soc. S. Br. Vol. 32, p. 127. Rhizome very thick and fleshy 6 inches long 2 through. Stems 4 to 6 feet tall. Leaves lanceolate acuminate more than a foot long and 3 inches wide, narrowed at the base, ligule very short. Scape over a foot tall, stout covered with sheathing leaves upper ones larger and uppermost with an ovate blade 2 inches long and one across. Spike short and broad 3 inches long and as thick. Bracts lanceolate, tips deflexed dull red, Flowers shortly protruding, Corolla tube slender, lobes narrow lanceolate acute. Lip shorter lanceolate acute side lobes hardly distinct. Anther longer cells narrowly oblong, beak about as long, narrow. "Flower stem a rich light brown and pink. Flower pale white reddish and brown inside."

Perak, open old jungle, rich rocky soil 2000 to 3000 feet Aug. 1884 (Kunstler 2219), Larut Hills (Ridley). Endemic.

3. Z. WRAYII, Prain. Mss. Ridl. Journ. Roy. As. Soc. S. Br. Vol. XLI, p. 32. Stem slender over a foot tall. Leaves elliptic lanceolate glabrous 9 inches long 3 inches wide, narrowed at the base but not petioled. Peduncle 4 inches tall covered with large loose sheathing leaves. Spike 3 inches long ovoid obconic. Bracts thin elliptic $1\frac{1}{2}$ inch long, $\frac{1}{2}$ inch wide or less. Flowers solitary yellow. Bracteole sapthaceous. Lip spotted and marked with purple. Anther narrow linear, beak $\frac{1}{8}$ inch long.

Upper Perak 300 feet (Wray 3735).

The specimen is in poor condition, but the plant seems distinct in its rounded head of thin bracts. Endemic.

4. Z. ZERUMBET, Sm. Exot. Bot. II. 104, t. 112. Rhizome thick yellow inside, becoming white. Stems stout 12-18 inches tall. Leaves broadly lanceolate glabrous 4-6 inches long, $2\frac{1}{2}$-3 inches wide, midrib hairy ligule $\frac{1}{2}$ inch long papery brown. Spike globose to oblong 3 inches long, blunt, peduncle 3-4 inches long. Bracts broad rounded green turning red, edges paler hairy. Calyx spathaceous $\frac{1}{2}$ inch long white. Corolla tube twice as long, lobes lanceolate acute white. Lip broad and short, side lobes rounded midlobe orbicular to ovate retuse pale yellow with an orange bar, or faintly mottled pink. Capsule oblong. Roscoe, Trans. Linn, Soc. VIII. 348, Scit. Pl. t. 84, Roxb. As. Res. XI. 346, Fl. Ind. i. 48, Horan. Prodr. 27, Bot. Mag. t. 2,000, Wight Ic. t. 2,003, Bak. Fl. Brit. Ind. VI. 247, Ridley l.c. 127.

S. spurium, Koen. Retz. Obs. iii. 60, *Zingiber*, sp. Griff. Notul iii 412, Ic. t. 351.

Amonum zerumbet, L. Sp. Pl. i. 1, Jacq. Hort. Vindob. iii. t. 54. *A. spurium* Gmel. Syst. i. 6. *A. sylvestre*, Poir. Encyc. Suppl. v. 548. *Zerumbet zingiber*, Lestib. Ann. Sc. Nat. ser. 2, XX. 329.

Singapore; Malacca; Selangor: Kwala Selangor (Ridley 7799); Perak: Larut (King's Coll. 2163). Common in waste ground, round villages. Native name "Lampoyang," used in native medicine. Widely distributed over Malaya.

5. Z. CASSUMUNAAR, Roxb. As. Res. XI. 347, t. 5, Fl. Ind. 149. Rhizome thick aromatic yellow inside. Stems 1 to 6 feet tall, leaves oblong lanceolate pubescent beneath 6-18 inches long, 2-3 inches wide, ligule short rounded. Peduncle 6-12 inches long. Bracts 1-1½ inch long and nearly as broad, greenish red to bright red edges hairy. Calyx tube spathaceous ½ inch long. Corolla tube little longer lobes yellowish white lanceolate acute 1 inch long. Lip three lobed, basal lobes oblong obtuse midlobe orbicular bilobed. Stamen shorter. Capsule small globose.

Rosc. Scit. t. 85, Bot. Mag. t. 1426, Horan. Prodr. 27 Bak. Fl. Brit. Ind. VI. 248.

Z. purpureum, Roxb. Trans. Linn. Soc. VIII. 348. *Z. Cliffordiae*, Andr. Bot. Rep. t. 555. *Z. montanum*, Link. Dietr. Sp. l. 52. *Amonum montanum*, Retz. Obs. III. 5. *Cassumunaar Roxburghii*, Colla. Nov. Gen. Scit. in Comm. Taur. 1830. Cultivated and occurring as an escape in waste ground.

Penang, Telok Bahang (Curtis 1924).

6. Z. CHRYSOSTACHYS, Ridl. l.c. 129. Stems graceful slender 2 feet tall purplish. Leaves about 10 lanceolate acuminate dark green 5 inches long, 1½ inch wide, ligule oblong 1 inch long. Peduncle 2 inches long stout. Spikes 4 inches, bracts broad truncate retuse bright yellow. Corolla tube short white lobes lanceolate acute 1 inch long. Lip base narrow linear, 3 lobed as long as the petals, lobes ovate obtuse white, midlobe and disc between the lobes mottled crimson apex bifid. Filament linear, anther cells elliptic, beak acute spotted pink.

Perak, Larut Hills (Curtis 2716) (Wray 3529). Endemic.

7. Z. CITRINUM, Ridl. l.c. Stems about 1 foot tall. Leaves dark green pubescent beneath broadly lanceolate with prominent primary nerves 8 inches long 4 inches wide, petiole short or none, ligule very short. Spike oblong blunt 4-5 inches long, peduncle 3 inches. Bracts broad rounded lemon yellow, becoming pink in fruit. Calyx dilated white tip bifid, ¾ inch long. Corolla tube graceful 2½ inch long, upper lobe lanceolate laterals connate and adnate to the lip for ½ of their length ¾ inch long, yellowish. Lip shorter side lobes large oblong rounded midlobe lanceolate blunt yellow. Stamen long.

Selangor: Ginting Peras, Ginting Bidai and Dusun Tua (Ridley 7797); Johor: Gunong Janeng (Kelsall); Perak: Ulu Bubong (King's Coll. 10263). Native name "Tepus Tenok." Endemic.

8. Z. GRACILE, Jack. Mal. Misc. 1, No. 1. Stems slender 2 feet or more. Leaves ovate to ovate lanceolate acute 6 inches long 2½ inches broad light green paler and pubescent beneath, ligule short. Peduncle 6 to 12 inches long, spike cylindric acute and narrowed into the peduncle at the base 4-6 inches long. Bracts pink ovate broad blunt or acute. Calyx lobes long lanceolate acute. Corolla tube 1 inch lobes lanceolate acute as long yellowish white. Lip side lobes oblong rounded ½ inch long, midlobe deeply bifid with acute lobes. Filament short, beak long. Capsule ½ inch long elliptic. Seeds 2 or 3, ¼ inch long ovoid black. Bak. Fl. Brit. Ind. VI. 246, Horan. Prodr. 27, Hook. Bot. Misc. i. 273.

Singapore: Bukit Timah (Ridley); Malacca: Sungei Hudang (Goodenough 1640), Mount Ophir (Hullett); Pahang: Tembiling, Tahan River (Ridley; Selangor: Kwala Lumpur, Bukit Hitam (Kelsall 1978) Penang (Jack.)

var. *elatior*, Ridl. A much taller and more slender plant, stems 5 feet tall, leaves narrow linear acuminate 10 inches long 1 inch wide. Peduncle 18 inches long, spike 7 or 8 inches.

Penang Hill (Ridley 9340); Perak: Larut Hills (King's Coll. 7954). In woods, endemic.

9. Z. PUBERULA, Ridl. l.c. 130. Stems 6 to 8 feet tall ½ inch thick. Leaves oblong acuminate 12 inches long 3¼ inch wide above deep green glabrous beneath with brown fur, petiole ¼ inch long, ligule ovate bilobed all covered with brown fur. Spikes fusiform acute 3 to 6 inches long, peduncle as long. Bracts ovate obtuse pink, pubescent edged with brown fur. Inner bract lanceolate. Calyx spathaceous 1 inch long shortly split truncate. Corolla tube 2 inches, lobes lanceolate creamy yellow 1 inch long, laterals shorter than upper one connate for a quarter of the length and adnate to the lip. Lip shorter than petals side lobes oblong rounded, midlobe longer blunt creamy white to bright yellow. Anther narrowly oblong brownish red, beak yellow.

Singapore: Serangoon Road (Ridley 4613), Bajau; Johor: Tanjong Kupang, Serom, Batu Pahat (Ridley); Sungei Ujong: Perhentian Tinggi (Ridley 9993); Selangor: Ginting Bidai (Ridley 7798. In woods. Endemic.

10. Z. GRIFFITHII, Baker l.c. 246. Stem about 3 feet tall, ¼ inch through. Leaves elliptic acuminate 8 inches long 3 inches wide glabrous above pubescent beneath, sheaths pubescent, ligule ⅛ inch long emarginate petiole nearly ½ inch long. Spikes fusiform 4-5 inches long, peduncle 3 inches. Bracts broadly ovate pubescent pink 1 inch long and broad. Calyx spathaceous ½ inch long. Corolla tube 1 inch long, lobes lanceolate acute, lower ones connate for about half their

length, yellowish white. Lip shorter side lobes rounded midlobe lanceolate acute. Anther oblong brown beak yellow. Ridley l.c. 131.

Singapore: Bukit Timah (Ridley); Johor: Bukit Tana Abang, Batu Pahat (Kelsall); Malacca: (Griffith) Bukit Sedanen (Goodenough 1434; Dindings: Tanjong Hantu (Ridley 7224). Common in woods. Native names "Tepus Merah," "Tepus Kechil."

var *major*. Stems about 5 feet tall stout, leaves elliptic oblong acuminate 18 inches long 5 inches across stiff sheaths glabrous, petiole very short. Spike glabrous. Flower 3 inches long. Corolla tube 2 inches.

Pahang: Kwala Tembeling (Ridley); Perak: Bujong Malacca (Ridley 9820). Endemic.

Z. officinale, Rosc. Trans. Linn. Soc. VIII. 348. Fl. Brit. Ind. VI. 246. The ginger "Haliya" is cultivated largely. It never establishes itself and its native country is not known.

11. Amomum, L.

Rhizome usually long, leafy stems tall. Leaves lanceolate oblong or linear. Inflorescence obconic from the rhizome, on a short peduncle. Bracts lanceolate or ovate containing 1 or more flowers enclosed in thin bracteoles. Calyx as long as the corolla tube. Lobes of corolla oblong or lanceolate. Staminodes absent or small. Lip large, often very large convolute. Stamen broad, crest rounded with two horn-like or linear processes from the upper part. Style shorter than the crest. Capsule globose or oblong sometimes covered with short processes. Seeds numerous.

Species African, India and Malayan.

No staminodes.

Lip large convolute obovate.

Anther crest small rounded upper angles prolonged ... ... 1. *A. xanthophlebium.*

Anther crest reniform, angles not prolonged ... ... 2. *A. flavum.*

Anther crestless, fruit softly spinose.

Lip bilobed at the tip, fruit oblong ... 3. *A. lappaceum.*

Lip entire denticulate, fruit large globose 4. *A. ochreum.*

Lip small boat-shaped ... ... 5. *A. uliginosum.*

Two staminodes developed.

Lip trilobed, spike cylindric ... ... 6. *A. cylindraceum*

Lip trilobed hastate, spike obconic ... 7. *A. hastilabium.*

Lip bifid at apex ... ... 8. *A. macrodons.*

Lip entire obovate, spike cylindric ... 9. *A. Perakense.*
Lip entire spoon-shaped ... ... 10. *A. testaceum.*
Lip entire oblong, spike very short ... 11. *A. micranthum.*

1. A. XANTHOPHLEBIUM, Baker Fl. Brit. Ind. VI. 241. Stems 6 feet tall ½ inch through. Leaves oblong lanceolate cuspidate 2 feet or more long 2-4 inches wide glabrous, petiole stout about 1 inch long, ligule short truncate ¼ inch long pubescent, spikes obconic 6 inches long or less, peduncle stout 4-6 inches long. Bracts oblong glabrous 2 inches long 1 inch across spreading red. Bracteoles spathaceous three lobed. Flowers solitary in the bracts. Calyx 1 inch trifid, lobes unequal pubescent brownish pink. Corolla tube thick 1½ inch long upper lobe broad ovate obtuse ½ inch wide, laterals oblong obtuse half as wide, all cherry red. Lip a little longer obovate convolute, yellow with red streaks and spots. Stamen filament broad linear white, base red, anther ½ inch long yellow, crest short rounded entire, processes horn-shaped linear yellow tipped red. Capsule elliptic oblong 1 inch long pubescent. Seeds numerous.

Ridley l.c. 133. *A. stenoglossum* Baker l.c. 234. Singapore: Bukit Timah (Ridley 9214); Bukit Mandai (Ridley 6544) Selitar (1658); Johor: Gunong Pulai; Malacca (Maingay) Nyalas (Goodenough 1339); Dindings: Pangkor (Ridley 7234); Perak: Larut Hills (King's Coll. 1957); Bujong Malacca (Ridley 9796) (Ridley 9796); Penang: Government Hill (Curtis 3037). Endemic. In forests up to 3000 feet elevation. Flowers in May and June.

2. A. FLAVUM, Ridl. l.c. 133. Stems 12 to 15 feet tall pubescent. Leaves 12 inches long 2 inches wide oblong lanceolate cuspidate pubescent beneath, petiole very short, ligule truncate, as long, spikes an inch long 2½ inch across subglobose on peduncles 1½ inch long. Bracts spathaceous bilobed ½ inch long pubescent. Corolla tube as long, lobes ochreous, upper one obovate hooded, laterals narrower oblong lanceolate. Lip an inch across obovate convolute, edges recurved ribbed yellow spotted red in centre. Stamen filament broad pale orange, anther narrow, crest reniform ¼ inch wide veined orange. Style shorter.

Penang: Waterfall Gardens (Curtis 2075). Penara Bukit (Ridley 7226). Distrib. Sumatra.

3. A. LAPPACEUM, Ridley l.c. 134. Rhizome stout. Stems about 6 feet tall, stout. Leaves oblong lanceolate acuminate cuspidate glabrous, not petioled 18 inches long 4 inches wide. Spikes numerous gradually elongating to 6 inches long cylindrical, rachis stout covered with brown tomentum. Flowers numerous pedicels ¼ inch long. Bracts oblong bifid red 1½ inch long 1 inch wide. Bracteole tubular ½ inch long trifid. Calyx tube as long lobes linear upper one broader ½ inch long, ochre yellow. Lip obovate rounded bilobed. Stamen short,

anther ½ inch long crestless. Ovary pubescent. Fruit oblong ¾ inch long covered with conic subulate spines, pedicels ½ inch long.

Selangor: Ginting Peras (Ridley 7802); Perak: (Scortechini 222). (Wray), Larut Hills (Ridley). Inhabits dense woods at an altitude of about 3000 feet. Fruit eaten by Sakais. Endemic.

4. A. OCHREUM, Ridl. l.c. 125. Stems tall and stout. Leaves oblong cuspidate glabrous, 3 feet long 7 inches wide, petiole ½ inch long thick, ligule oblong obtuse. Spike short globose elongating in fruit peduncle 1½ inch long. Bracts lanceolate 1½ inch long thin. Bracteole tubular ½ inch long edge hairy. Flowers large yellow. Calyx as long as corolla tube 1 inch lobes lanceolate subobtuse, tipped with hair. Corolla tube thick, lobes oblong obtuse ¾ inch long. Lip very large over an inch long convolute edge denticulate. Anther oblong ½ inch long. Fruit large globose green succulent, covered with short processes.

Selangor: Ginting Bidai (Ridley). Endemic.

5. A. ULIGINOSUM, Koen. Retz. Observ III. 56. Rhizome long much branched, covered with brown sheaths, ¼ inch through. Stems 5 feet tall or less. Leaves narrowly lanceolate narrowed to the base long cuspidate 12 inches long 1 inch wide petiole short or 0, ligule ⅛ inch long rounded. Spikes distant from leaves obconic, on a peduncle 1-4 inches long. Bracts ovate elliptic pink or brown. Calyx tubular pink ½ inch long, lobes narrow acute. Corolla tube little longer, lobes narrow linear acute rosy. Lip boat-shaped narrowed at the base geniculate with thickened deep crimson knees, blade white with yellow central bar edged crimson, ½ inch long. Staminodes 0. Stamen filament broad, anther oblong, crest 3 lobed, lobes short quadrate, central one retuse. Fruit globose ½ inch through covered with soft red processes. Baker Fl. Brit. Ind. VI. 241, Ridl. l.c. 136.

Malacca: Bukit Sedanen (Derry 238); Sungei Ujong: Bukit Tampin; Pahang: Kwala Tembeling (Ridley 2404); Perak: Larut (King's Coll. 1839); Dindings: Larut (Ridley 7223); Penang: Balik Pulau (Ridley 9414). Kedah, Yan (Ridley). Distrib. Siam.

Abundant in woods and on banks in forest to about 3000 feet alt creeping for some distance. Sometimes planted by the Jakuns for its eatable fruit. Malay names "Pua Hijau," "Pua Gajah," "Tepus Merah."

6. A. CYLINDRACEUM, Ridl. l.c. 136. Stems 6 feet tall. Leaves oblong lanceolate acute grey-green, base narrowed glabrous 18 inches long, 2 inches wide, petiole none, ligule large ½ inch long bifid, lobes acute. Spike cylindrical stout 6 inches long, peduncles as long stout covered with rufous tomentum, sheaths oblong 1 inch long. Bracts ovate bifid rown. Bracteole ½ inch long truncate bifid. Calyx ¾ inch truncated pubescent. Corolla tube an inch long slender pubescent, lobes oblong

obtuse orange. Lip 3 lobed, lobes rounded darker orange. Staminodes lanceolate acuminate. Anther crest oblong with 2 points at the side. Fruit globose rough brown with numerous low ribs, ½ inch long.

Dindings, Telok Sera (Ridley). Woods, flowering January, fruit March. Endemic.

7. A. HASTILABIUM, Ridl. l.c. 137. Rhizome rather slender aromatic woody, short. Stems 3-4 feet tall stout glabrous. Leaves oblong lanceolate acuminate at both ends 9-18 inches long 2-4 across, petiole ½ inch long, ligule ovate rounded ¼ inch long. Spike short obconic 1-2 inches tall, peduncle stout 1 inch. Bracts ovate lanceolate ribbed stiffly papery light brown 1 inch long ½ inch long cylindric truncate. Corolla tube 1 inch long slender terete, lobes oblong blunt white ½ inch long. Lip broadly hastate base narrow linear side lobes rounded white midlobe narrow oblong obtuse orange, central bar darker, with purple marks at the sides 1 inch long and wide. Staminodes lanceolate acuminate tip setaceous. Filament broad linear, anther oblong cells red, crest broad oblong truncate pale orange. Fruit globose ½ inch long fawn colour strongly ribbed hairy.

Singapore: Bukit Timah (Ridley 9204); Johor: Gunong Panti (Ridley); Selangor: Dusun Tua; Perak (Wray 3476). Woods, flowers in May. Endemic.

8. A. MACRODONS, Scort. Nuov. Giorn. Bot. Ital. 1886, p. 309, Pl. XII. Rhizome rather stout. Stem 2 feet tall slender. Leaves 4 or 5 elliptic caudate 6 to 8 inches long 2-3 wide. Spike obconic 2 inches across from the rhizome. Bracts ovate lanceolate densely streaked red. Bracteoles shorter. Calyx tubular spathaceous. Corolla tube ⅜ inch long lobes ovate ¼ inch. Lip as long oblong bifid, lobes rounded, pubescent tip yellow base purple. Staminodes lanceolate red as long as the calyx lobes puberulous. Filament linear narrower than the anther, crest rounded emarginate ciliate, anther cells linear.

Perak, Kinta (Scortechini 2027). Not seen.

9. A. PERAKENSE, Ridl. l.c. 135. Rhizome stout woody elevated above the ground on stout woody roots. Stems slender about ¼ inch through. Leaves narrow lanceolate acuminate with a long point narrowed at the base, petiole hardly distinct, 8 inches long 1 broad. Peduncles 2 inches long flexuous. Spike about as long rather narrow sub-cylindric. Bracts narrow oblong caducous ¾ inch long. Bracteole oblong obtuse flat. Calyx tube ⅕ inch long dilated upwards lobes lanceolate acute. Corolla tube slender, barely longer than the calyx, lobes ⅜ inch long or less. Lip obovate longer. Staminodes present, longer than the filament linear setaceous. Anther linear ¼ inch long, crest rounded distinct.

Perak, Larut Hills (Ridley) (Wray 3541). Endemic.

10. A. TESTACEUM, Ridl. l.c. 135. Stems 12 feet tall stout clubbed at the base. Leaves lanceolate cuspidate gradually narrowed

to the base, 2 feet long 4 inches wide glabrous. Spikes several cylindric or fusiform 3-4 inches long on peduncles 6 inches long covered with the green sheaths. Bracts papery striate and pale brown oblong subacute 1½ inch long ½ inch wide silkily pubescent. Bracteoles tubular fawn colour silky bilobed ½ inch long' Calyx trifid silky. Corolla tube barely longer lobes linear oblong white ½ inch long. Lip spoon-shaped a little longer white, tip yellow, with two red lines at the base. Staminodes oblong truncate buff. Filament broad, anther short narrower, quadrate, upper angles produced, crest entire oblong blunt. Ovary silky.

Pulau Tiuman (Ridley). Selangor, Kwala Lumpur Caves (Ridley 8173). In thick woods flowering in December. Endemic.

11. A. MICRANTHUM, Ridley l.c. 138. Rhizome far creeping slender, roots long woolly. Stems slender 2 feet tall. Leaves narrow lanceolate acuminate 6-7 inches long ¾ inch wide glabrous dark green, petiole very short or 0, ligule very short truncate. Spikes short obconic dense 1 inch long, on peduncles as long. Bracts narrow lanceolate acute pubescent ¼ inch long brown. Flowers very small ½ inch long. Calyx green with 3 short acute lobes. Corolla tube a little longer ¼ inch long, lobes linear narrow pale yellow. Lip oblong enlarged towards the apex, then suddenly narrowed and bifid, pale yellow dotted pink. Staminodes short linear. Filament tapering upwards. Anther small oblong, upper angles produced into acute curved processes with a small rounded entire crest. Fruit small globular covered with short processes purple brown.

Penang Hill (Curtis 2884) (Ridley 9337); Negri Sembilan: Gunong Angsi (Ridley 10,008); Perak: Gunong Horan (Scortechini 614). Endemic.

12. HORNSTEDTIA, Retz.

Rhizome stout. Stems tall rarely under 10 feet stout. Leaves oblong. Spikes on a long or short peduncle from the rhizome, conic or hemispheric or subcylindric. Outer bracts large red, ovate or oblong forming a cup. Bracteoles thin tubular. Flowers numerous sessile. Calyx spathaceous thin. Corolla long or short tubed lobes narrow connivent. Lip narrow linear or oblong, sides at the base convolute over the stamen. Staminodes 0. Stamen short and thick, anther fleshy, bent at an angle with the filament, crest very small or none. Capsule oblong with thin cartilaginous walls and numerous black seeds, or subglobose, with a fleshy pericarp and bony walls, seeds brown.

§ 1. EU-HORNSTEDTIA. Peduncles short, spike cylindric or subglobose. Fruit oblong cartilaginous, concealed in the persistent bracts. Lip little longer than the petals linear fleshy, outer bracts ovate or lanceolate stiff.

Outer bracts glabrous longitudinally and transversely ribbed	1. *H. scyphus.*
Outer bracts pubescent finely longitudinally ribbed, ovate lanceolate acute	2. *H. ophiuchus.*
Broadly ovate quite obtuse	3. *H. striolata.*
Outer bracts edges hispid, transversely ribbed	4. *H. grandis.*
Outer bracts silvery tomentose	5. *H. conica.*
Outer bracts thin lanceolate.	
Stems tall, flowers numerous	6. *H. Leonurus.*
Stems under a foot, flowers few	7. *H. pusilla.*
Lip much longer than the corolla, thin.	
Spike large ovate with ovate bracts ...	8. *H. triorgyale.*
Spike cylindric short, flowers few ...	9. *H. albomarginata*
Flowers 2 or 3 only, with thin anceolate bracts.	10. *H. pauciflora.*
Bracts ovate thin.	
Lip spathulate red edged yellow	11. *H. megalochilus.*
Lip linear emarginate red, centre yellow ...	12. *H. metriochilus.*
Lip linear deeply bifid pink	13. *H. macrochilus.*
§ 2. PHAEOMERIA. Spikes conic or globose, on long peduncles, outer bracts large usually spreading involucral. Fruit in a large head, onconic silky or hairy, pericarp fleshy green, endocarp bony.	
Involucral bracts ovate spreading pink ...	14. *H. imperialis.*
Involucral bracts ovate acute bright red ...	15. *H. fulgens.*
Involucral bracts erect forming a cup	16. *H. venusta.*
Involucral bracts not spreading ovate obtuse, head small globose	17. *H. Maingayi.*

§ 2. EU-HORNSTEDTIA.

1. H. SCYPHUS, Retz. Observ. IV. 18. Rhizome stout and woody. Stems 10 feet tall $\frac{1}{2}$ inch through. Leaves oblong base oblique 2 feet long 6 inches wide dark green glabrous above paler pubescent beneath petiole $\frac{1}{4}$ inch long, ligule oblong obtuse hairy nearly $\frac{1}{2}$ inch long. Spike cylindric on a short stout peduncle, covered with oblong ovate red bracts, outer ones empty 2 inches long $1\frac{1}{2}$ inch wide longitudinally and transversely ribbed thick and stiff. Bracteoles lorate lanceolate 2 inhes long $\frac{1}{4}$ inch wide, tipped dark red. Flowers solitary in the bracts $3\frac{1}{2}$ inch long. Calyx spathaceous 1 inch long trifid flattened red tipped with white. Corolla tube much longer slender red, lobes lonceolate oblong, upper one hooded $\frac{3}{4}$ inch long $\frac{1}{4}$ inch wide lower ones shorter adnate to the lip below, shining red. Lip a little longer side

lobes rounded, embracing the stamen. Apex fleshy tongue-shaped dark red pubescent. Filament short. Anther cells linear grey lower part pubescent, crest ovate rounded. Ovary glabrous. Capsule oblong subtriangular ¾ inch long thinly cartilaginous. Seeds black truncate angled $\frac{1}{16}$ inch long. Ridley l.c. 140.

Amomum scyphiferum, Koen. Retz. Observ. III. 68, Bak. Fl. Brit. Ind. 140. *Stenochasma urceolare*, Griff. Notul. III. 431.

Singapore: common Bukit Timah (Ridley 4616), Jurong (446); Johor: Tanjong Bunga (Ridley); Selangor: Kwala Lumpur (Ridley 10,175); Malacca: Ching (Griffith). Distrib. Borneo and Sumatra.

Common in woods in the low country, flowering all the year round.

2. H. OPHIUCHUS, Ridl. l.c. 141. Stems about 12 feet tall clubbed at the base. Leaves oblong lanceolate glabrous 15 inches long 3 inches wide, petiole ½ inch long, ligule ovate oblong obtuse pubescent. Spike fusiform 5 inches long. Bracts ovate or ovate lanceolate acute mucronate ribbed silky pubescent red 2 inches long 1 inch wide. Flowers 5 inches long red. Calyx tubular 3 inches long acute silky below glabrous above. Corolla tube graceful lobes lorate cucullate shining red. Lip as long lorate apex hooded fleshy red with white edges pubescent inside. Anther emarginate, no crest red. Ovary silky.

Amomum Ophiuchus, Ridl. Trans. Linn. Soc. III. p. 381.

Pahang Tahan Woods, (Ridley). Endemic.

3. H. STRIOLATA, n.sp. Stems tall and stout, leaves narrow linear lanceolate acuminate glabrous 18 inches long 2 inches across petiole 3 inches long slender, ligule oblong ½ inch long, spike 5 inches long an inch through in the widest part peduncle short covered with imbricating bracts. Bracts ovate quite obtuse with a very short mucro an inch long and nearly as wide closely ribbed, lower part glabrous above finely pubescent with longer hairs on the edge and tip. flowers red. Bracteole thin papery lanceolate with three fine ribs, an inch long. Calyx longer 1½ inch long thin unequally bilobed with two lobes connate to near the top glabrous strongly keeled. Corolla tube two inches long, lobes linear oblong blunt an inch long $\frac{3}{16}$ inch wide. Lip as long firm in texture linear oblong edges upcurved white, hairy insides, lobes thinner curved up over the anther. Anther a little shorter than the lip, crest large rounded entire.

Selangor, Hulu Semangkok (Ridley 12,105).

4. H. GRANDIS, Ridl. l.c.c. Rhizome stout elevated above the ground on long roots. Stems 12-15 feet tall bases clubbed. Leaves oblong cuspidate nearly 3 feet long, 6 inches across glabrous, petiole ½ inch long pubescent, ligule longer pubescent. Spikes elongate obconic cylindric 8 inches tall. Bracts ovate rounded edges hispid and covered with transverse irregular elevations, the longitudinal ribs obscure. Bracteoles narrow lanceolate. Calyx cylindric tubular 3 lobed 2 inches

long. Corolla tube nearly 5 inches long, dilate upwards. Upper lobe lanceolate 1 inch long, lower ones oblong lanceolate. Lip side lobes small apex rounded pubescent. Filament free ¼ inch long hairy crest ovate acute.

Perak, Larut Hills, to 3000 feet elevation abundant (Ridley). Endemic.

5. H. CONICA, Ridl. l.c. 142. Rhizome subterranean. Stems about 5 feet tall. Leaves oblong lanceolate cuspidate 2 inch long, 3-4 inches wide glabrous above sometimes pubescent beneath, petiole ½-1 inch long fusiform acuminate. Bracts ovate acute, upper ones narrower and longer pink covered with silvery tomentum, longitudinally ribbed. Bracteoles narrow. Flowers purplish pink shortly protruded. Calyx tubular with a long cusp 2 inches long. Corolla tube 4 inches lobes oblong obtuse ½ inch long. Lip longer tongue-shaped blunt entire.

Singapore: Bukit Panjang (Ridley); Johor: Batu Pahat (Ridley 11,195), Gunong Panti; Selangor: Langkat, Bukit Hitam (Ridley 7803). Endemic.

6. H. LEONURUS, Retz. Observ. VI 18. Rhizome subterranean rather slender. Stems about 12 feet. Leaves oblong acuminate base truncate, glabrous, polished dark green 16 inches long 4½ inches across ligule rounded ¾ inch long. Spikes cylindric buried in the ground. Bracts lanceolate acute thin silvery pubescent 2½ inch long ¾ inch wide. Calyx tubular spathaceous 3 inches long. Corolla tube as long, lobes linear hooded, upper one ¼ inch across 1 inch long, lower ones narrower red with whitish tips. Lip hastate blunt sides upcurved, red. Stamen filament broad deep red 1½ inch long. Anther oblong ½ inch blunt, no crest.

Ridley l.c. 142. *Amomum Leonurus*, Koen. Retz. Observ. iii. 69. Bak. Fl. Brit. Ind. VI. 236. *A. Ridleyi*, Bak. Kew Bulletin 1892, 127, *Stenochasma convolutum*, Griff. Not. iii. 433.

Singapore: Bukit Panjang (Ridley 96), Pulau Ubin (Ridley 9494); Johor: Gunong Panti (Ridley); Malacca: (Koenig) Rim (Griffith); Pahang: Pulau Tawar (Ridley); Dindings: Bukit Segari (Ridley). Common in woods. Native name "Pua Hitam." Endemic.

7. H. PUSILLA, Ridl. l.c. 143. Rhizome slender woody sinuous. Stems 8 inches tall very slender. Leaves few 3 or 4, elliptic lanceolate long cuspidate 6 inches long 1½ inch wide, base broad, ligule very small, sheaths hispid. Spike small few flowered, peduncle ½ inch long. Bracts ovate mucronate glabrous red. Bracteole cylindric ribbed pubescent. Calyx short. Corolla tube about half an inch long, lobes linear red. Lip narrow linear entire fleshy. Anther ⅜ inch long hardly retuse at tip, no crest.

Pahang, Kwala Tembeling (Ridley). Endemic.

8. H. TRIORGYALE, Ridl. l.c. 144. Stems 18 feet tall pubescent, stout. Leaves oblong acute 2½ feet long, 7 inches across glabrous above softly pubescent beneath petiole ½ inch long, ligule large. Spike ovate 4 inches long 2 inches through. Outer bracts broad ovate 2 inches long and as wide longitudinally ribbed pubescent, deep rose colour. Inner bracts lanceolate 2½ inches long, rosy at tip. Bracteoles bifid tubular. Calyx bifid mucronate 3 inches long, cherry red. Corolla tube as long, lobes linear oblong blunt, upper one largest blunt an inch longer than the corolla cherry red. Anther emarginate no crest.

Amomum triorgyale, Bak. Fl. Brit. Ind. VI. 237.

Selangor: Ginting Peras (Ridley 7806); Perak: Larut Hills (King's Coll. 2105). Endemic.

9. H. ALBOMARGINATA, Ridl. l.c. 145. Rhizome long far creeping. Stems 4 to 10 feet tall slender red glabrous. Leaves when young light green barred with red, when full grown dark polished green, glabrous or finely pubescent, sessile, ligule short and broad. Spikes 2 inches long subcylindric few flowered. Bracts lanceolate mucronate red 2 inches long ½ inch wide ribbed pubescent. Bracteoles thinner red edged with yellow hairs. Calyx tubular trifid 1½ inch long, lobes tipped with yellow hairs. Corolla tube twice as long, lobes linear deep red, tipped with white hairs, lower ones curved up over the lip. Lip 2 inches long sides embracing stamen edged white, apex narrow linear entire or obscurely three lobed at the tip deep red. Filament red. Anther oblong entire ½ inch long.

Amomum sphoerocephalum, Bak. Fl. Brit. Ind. VI. 234.

Penang Hill, common; Dindings: Lumut (Ridley 7233); Selangor: Petaling (Ridley); Negri Sembilan: Kwala Pedas (Ridley); Perak: Larut Hills to 3000 feet abundant, Gunong Keledang (Ridley 9575). Endemic.

10. H. PAUCIFLORA, Ridl. l.c. 144. Stems rather slender distant 12 feet tall. Leaves oblong cuspidate glabrous 1½ feet long 4 inches wide, petiole ½ inch long ligule lanceolate 1 inch. Spikes deeply sunk in the ground 2 to 4 flowered. Bracts narrow lanceolate to fleshy white. Calyx tube dilate upwards trifid lobes acute 3 inches long red. Corolla tube as long upper lobe lanceolate subacute cherry red, lower ones shorter oblong obtuse deep red. Lip narrowly lanceolate obtuse, side lobes rounded flame colour central bar yellow. Filament short. Anther emarginate deep red.

Selangor, Kwala Lumpur Caves (Ridley 8174). Endemic.

11. H. MEGALOCHILUS, Ridl. l.c. 146. Stem tall and stout 12 to 15 feet tall, and 1½ inch through the clubbed base. Leaves broadly oblong cuspidate base oblique rounded glabrous 2-3 feet long 2½ to 4½ inches wide, petioque ½-1 inch long. Spikes 2 to 3 inches long, deeply sunk in the ground on peduncles 1-1½ inch long. Bracts ovate acute

mucronate ribbed margins ciliate, bright red, 1 inch long. Bracteoles linear lanceolate pubescent. Calyx 3 inches long, trifid lobes acuminate. Corolla tube 2 inches long, lobes linear acute 1 inch long red. Lip 2 inches longer than the corolla sides rolled up at base, limb spathulate apex entire or emarginate, red edged yellow. Anther short oblong ½ inch long emarginate crestless red.

Achasma megalocheilus, Griff. Notul. III. 426, Pl. CCCLV.

Amomum megalocheilus, Bak. Fl. Brit. Ind. VI. p. 236. *A. rubro-luteum* Baker l.c.

Singapore : Bukit Mandai (Ridley) ; Pahang : Tahan Woods (Ridley); Malacca : Base of Mount Ophir (Griffith) ; Bukit Sadanen ; Negri Sembilan : Bukit Tampin ; Selangor : Kwala Lumpur, Langat (Ridley) ; Perak : Larut Hills (King's Coll. 2933) (Ridley 7232, 9338) ; Penang : Government Hill (Curtis 2419).

Common in low wet woods often forming dense thickets. Endemic.

12. H. METRIOCHILUS, Ridl. l.c. 147. Stem tall and stout about 12 feet. Leaves oblong mucronate, glabrous above, softly velvety pubescent or glabrous beneath over 3 feet long and 6 inches wide, petiole stout 2 inches long, peduncle stout. Bracts ovate mucronate ribbed glabrous red, an inch long. Corolla tube no longer than the calyx, 2 inches long, lobes broad lanceolate crimson an inch long. Lip 2 inches longer than the corolla linear emarginate the sides convolute round the stamen crimson with a yellow centre. Filament very short. Anther longer, broad almost square emarginate deep pink.

Achasma metriocheilus, Griff. Notul. iii. 427. Ic. Pl. As. t. 356. *Amomum metriochilus*, Bak. Fl. Brit. Ind. VI. 234.

Johor : Gunong Panti, Gunong Pulai, Batu Pahat (Ridley) ; Selangor : Ginting Bidai (Ridley 7812) ; Perak : Larut Hills (Curtis) ; Ipoh : (Curtis 3317) (Wray 3444) ; Penang Hill ; Malacca : (Griffith). Damp woods. Endemic.

13. H. MACROCHILUS, Ridl. l.c. 147. Stems about 12 feet tall stout. Leaves elliptic oblong cuspidate base rounded unequal glabrous 15 inches long 4 inches wide, petiole ½ inch long or less, ligule ovate shorter. Spike subcylindric. Bracts rather thin lanceolate acute glabrous ribbed 2 inches long. Bracteoles narrow linear glabrous. Calyx tubular dilate upwards trifid, lobes acute 1½ inch long. Corolla tube 2 inches long, lobes short broad blunt. Lip 1¼ inch long narrow linear deeply bifid, lobes ¼ inch long narrow, all dark rose pink. Anther ¼ inch long deeply emarginate.

Achasma macrocheilus, Griffith Notulae iii. 429, Ic. Pl. t. 357. *Amomum macrochilus*, Bak. l.c. 235. *A. gomphochilus*, Bak. l.c. 226.

Johor : Kwala Tebing Tinggi, Batu Pahat (Ridley) ; Malacca : Ayer Panas (Griffith) ; Perak : Larut Hills (Curtis, King's Coll. 1897). Endemic.

§ 2. PHAEOMERIA.

14. H. IMPERIALIS, Ridl. l.c. 148. Rhizome short and stout. Stems about 13 feet tall and stout 1 inch through. Leaves oblong acute green glabrous 2 feet long, 6 inches across, ligule ovate blunt nearly 1 inch. Peduncle about 3 feet tall. Spikes cone-shaped, elongating to 4 inches long. Lower bracts spreading ovate oblong, 4 inches long, 2 inches across, fleshy. Floral bracts linear oblong narrow pink edged white. Bracteoles tubular spathaceous 3 lobed short. Calyx ½ inch long, deeply bifid. Corolla tube 1 inch long, lobes lorate thin obtuse pink. Lip longer narrow oblong obtuse, sides convolute crimson edge white. Filament linear flat pubescent white. Anther oblong emarginate crimson. Fruits obconic green hairy 1 inch through in a compact head.

Phaeomeria imperialis, Lindl. Introd. Nat. Syst. Ed. 2, 446. *Alpinia magnifica*, Roscoe Scit. 75. Bot. Mag. 3192. *Nicolaia imperialis*, Horan Mon. Scit. 32 Pl. i.

Johor: Kota Tinggi (Ridley); Perak: Thaiping Waterfall (Rldley). Probably Garden escapes.

Commonly cultivated for its flower shoots, used in curry. Native name "Kantan."

var. *speciosa*, Ridl. l.c. Margins of lip yellow.

Elettaria speciosa, Bl. Enum. I. p. 51. *E. anthodioides* Teysm. *Alpinia elatior*, Jack. Hook. Journ. Bot. I. p. 359. *Amomum speciosum*, Benth. and Hook. Gen. Pl. III. 644.

Selangor: Rawang (Ridlev 7811); Perak: Tambun, Ipoh (Ridley); Larut Hills (King's Coll. 3075). Distrib. Java, Sumatra.

15. H. FULGENS, Ridl. l.c. 149. Rhizome stout. Stems 15 feet tall 1 inch through. Leaves oblong base unequal broad 2 feet long 6 inches wide glabrous except the edge hairy dark green above purple beneath, petiole 1 inch long, ligule brown woolly. Peduncle 4 feet tall ¾ inch through. Spike conic 3 inches tall 4 across. Bracts (involucral) stiff coriaceous ovate mucronate 3 inches long and wide, dull red outside polished blood red within, edges greenish white. Floral bracts linear oblong dull red edged white. Calyx spathaceous with 2 points 1¼ inch. Corolla lobes linear obtuse pink 1½ inch long. Lip ovate obtuse deep red, edged yellow half an inch long. Anther red deeply notched ¼ inch long. Fruit obconic with a long beak 1½ inch long yellow velvety.

Perak, Larut Hills (Ridley). Endemic.

16. H. VENUSTA, Ridl. l.c. 149. Stems 10 feet tall bases swollen Leaves oblong green over 2 feet long, 6 inches wide, narrowed at base gliule short edge pubescent. Scape 2 feet tall ½ inch through, sheaths (lower) arachnoid upper ones pink, spike broadly cup-shaped base much

broader than the peduncle, 3 inches tall, 5 wide. Involucral bracts very broad oblong tips recurved 3 inches long 2¼ inches wide rosy. Floral bracts linear oblong 2 inches long ¼ inch wide. Bracteole shorter spathaceous. Calyx 1½ inch long trifid deep red. Corolla lobes linear spathulate 1¼ inch long blunt pink. Lip half an inch long oblong apex rounded blunt white, centre spotted pink. Filament hairy. Anther oblong white with yellow hairs emarginate. Fruit obconic with a long beak glabrous red 3 inches long 1½ inch through.

Selangor, Ginting Bidai (Ridley 7810). Endemic.

17. H. MAINGAYI, Ridl. l.c. 150. Rhizome very long, with red shoots. Stems distant 9 feet tall ¾ inch through. Leaves oblong acute 18-24 inches long 5 inches wide glabrous above pubescent beneath, petoile ½ inch long. Peduncle one or two inches to a foot tall, sheaths pink, tips oval. Spike subglobose 1½ inch long. Outer bracts appressed broad rounded retuse pink with silvery pubescence, margins glabrous crimson. Inner bracts lanceolate over an inch long. Bracteole spathaceous tubular 1 inch long, with three points. Flowers 2 inches long rose colour. Calyx tubular with 3 lanceolate points longer than corolla. Corolla lobes blunt oblong. Lip 3 lobed, side lobes erect oblong, midlobe longer deep rose. Filament linear, anther oblong more than ¼ inch excavate crimson. Fruit obconic ½ inch long nearly glabrous, pink.

Amomum Maingayi, Bak. Fl. Brit. Ind. VI. 235.

Nicolaia pallida, Horan Prodr. l.c.

Singapore: Bukit Timah (Ridley 6539). Sungei Buluh (6237); Johor: Batu Pahat, (Ridley); Pahang: Kota Glanggi; Selangor, Dusun Tua (Ridley 7801); Perak: (Wray 3600).

13. PLAGIOSTACHYS, Ridl.

Stems tall leaves lanceolate. Spike or panicle from the side of the leafy stalk on a short peduncle with sheathing leaves. Flowers small, very densely crowded, with oblong ovate laciniate bracts. Calyx spathaceous short. Corolla tube short and thick, lobes oblong fleshy. Lip flat oblong. Staminodes 2 short subulate processes. Stamen short and thick. Anther oblong emarginate crestless. Capsule ovoid or oblong, crustaceous, 3 celled, seeds 3-4 in each cell.

Species 2 Malayan.

P. lateralis, Ridl. Journ. Roy. As. Soc. S. Br. 32, p. 152.

Rhizome thick. Stems 6 feet tall stout. Leaves lanceolate acuminate pubescent 2½ feet long, 4 inches wide, petiole 1 inch long, ligule obtuse bilobed ¼ inch. Spike solitary or 3 on a peduncle stout, 6 inches long cylindric, rachis pubescent thick bracts brown oblong laciniate. Calyx as long as the corolla tube white, ¼ inch. Corolla lobes ovate acute dark red fleshy ⅜ inch long. Lip short emarginate papillose orange yellow. Stamen pubescent white. Staminodes minute. Capsule ½ inch long ovoid conic pale brown.

Amomum laterale, Ridl. Trans. Linn. Soc. III. p. 381.

Singapore: Bukit Timah (Ridley 4411); Bukit Mandai (4620); Johor: Batu Pahat (11197); Pahang: Pulau Tawar; Negri Sembilan: Perhentian Tinggi (9999.) In very damp spots in forests. Endemic.

14. ELETTARIOPSIS, Bak.

Rhizome long creeping and branched slender. Leaves solitary, or a few in tuft or on an erect stem. Flower spikes scattered on elongate branches of the rhizome, very short with a few fugacious flowers in the axils of dry brown bracts. Calyx tube long 3 lobed, corolla tube long and slender, lobes narrow. Lip longer obovate or oblong white with a central yellow bar and red streaks. Staminodes 0. Filament short. Anther crest large rounded. Fruit a globose capsule.

Species 7 Malayan.

Leaf solitary 4 feet tall	1. *E. exserta.*
Leaf 1-2 feet	2. *E. Curtisii.*
Leaves few in a tuft	3. *E. serpentina.*
Leaves several on an erect stem.	
Stem 1 foot. Corolla tube 3 inches long	4. *E. latiflora.*
Stem 2 feet. Corolla tube 1 inch long ...	5. *E. pubescens.*
Stem about 2	6. *E. cyanescens.*
Stem several feet tall. Corolla tube long	7. *E. longituba.*

1. E. EXSERTA, Bak. Fl. Brit. Ind. VI. 251. Leaf usually solitary elliptic acute tapering to the petiole 4 to 6 feet tall, the blade 3 feet long 1 foot across. Scape erect with several scattered sheaths half inch long and a single flower. Calyx tube 3 lobed 1 inch long. Corolla tube 3 inches long lobes lanceolate ¾ inch long. Lip oblong entire yellow with 2 central red lines. Stamen crest short rounded. Style longer. Ridl. l.c. 153. *Cyphostigma exsertum* Scort. Nuov. Giorn. Bot. Ital. VIII. 310, t. 13.

Perak, Kinta (Scortechini 1947.) Endemic.

2. E. CURTISII, Bak. l.c. 252. Rhizome far creeping, roots woolly. Leaf solitary, blade 12 inches long 3 inches wide lanceolate acuminate glabrous, tapering into a petiole 8 inches long with a long ribbed sheath at the base. Flowering stems short 3 inches long. Bracts oblong lanceolate ½ inch long. Spikes 1-2 flowered. Calyx tube spathaceous ampliate unequally trifid 1 inch long. Corolla tube 2 inches long slender dilate upwards lobes oblong blunt white ½ inch long ¼ inch wide. Lip obovate oblong, ¾ inch long. Filament short and broad. Anther crest oval entire large. Ridley l.c. 154.

Penang, Bukit Laksamana (Curtis 1705.) Endemic.

3. E. SERPENTINA, Bak. l.c. 252. Rhizome as in *E. Curtisii* Leaves 3 in a tuft lanceolate acuminate at both ends glabrous blade 6-8

inches long, petiole 4 inches. Flowering stems 2 inches long covered with short oblong brown sheaths. Calyx tube 1 inch lobes linear ¼ inch. Corolla tube as long, lobes oblong ½ inch long white. Lip oblong obovate cuneate tip rounded ¾ inch long. Stamen filament broad and short. Anther crest very large oblong rounded. Ridl. l.c. 154.

Penang, 1000 to 1500 feet alt. (King's Coll. 1706). "Flowers white, red brown and yellow in the centre." Flowers in May. Endemic.

4. E. LATIFLORA, Ridl. l.c. 154. Rhizome far creeping ¼ inch through. Leafy stems 6-12 inches. Leaves about 5, lanceolate to ovate lanceolate cuspidate glabrous above, pubescent beneath 10-13 inches long 2-4 inches wide, petiole 2-4 inches long. Flower stems 3-6 inches long or more, spikes rather distant 2-flowered. Bracts closely wrapping the flower pinkish ½ inch long. Calyx 1½ inch long, apex entire lanceolate. Corolla tube 3 inches slender, lobes oblong obtuse ¾ inch long yellowish white. Lip large obovate 1 inch long and as wide white, central bar yellow with crimson line on each side apex yellow, or altogether yellow. Staminodes sometimes present short linear or bodies free or adnate to the stamen ¼ inch long or less. Stamen short and broad, crest ovate toothed.

Singapore : Bukit Timah (Ridley 5027) ; Perak : Larut (King's Coll. 2886) ; Bujong Malacca (Ridley 9789) ; Kedah : Gunong Jerai (Ridley). In dense woods. Endemic.

5. E. PUBESCENS, Ridl. l.c. 155. Stems stout ½ inch through 2 feet tall. Leaves about 5 or 6 oblong lanceolate cuspidate, glabrous above softly thickly pubescent beneath 6 to 8 inches long 1½-2 inches wide, petiole ¼ inch long. Floral stems as much as 2 feet long, slender. Spikes distant 1 inch or less long, bases covered with scale leaves. Bracts ovate lanceolate ½ inch long pubescent ribbed edges ciliate. Flowers in pairs. Calyx 1 inch lobes linear acute, silkily hairy. Corolla tube thick as long or little longer silky lobes narrow linear oblong obtuse ½ inch long white. Lip 1 inch long obcuneate obtuse pubescent. Stamen anther crest large 3 lobed.

Amomum elattarioides, Bak. Fl. Brit. Ind. VI. p. 240.

A. biflorum, Jack. Mal. Misc. I. 2. *A.* sp. Griffith Notulæ As. III. 417. *Elettaria*, sp. Griff. l.c. Tab. CCCLII. 2.

Penang : Waterfall (Curtis 2276), (Ridley 9332), Penara Bukit (Ridley 7236) ; Dindings : Lumut (Ridley 10,348) ; Negri Sembilan : Tampin (Goodenough 1933) ; Malacca : (Griffith).

Thickets and waste ground occurring in masses especially near villages. Native name "Pua Kampong." Endemic.

6. E. CYANESCENS, Ridl. Journ. Roy. As. Soc. S. Br. Vol. 41, p. 32. Rhizome ¼ inch through, violet inside covered with dry sheaths stems

18 inches tall rather slender. Leaves 8 lanceolate acuminate glabrous 6 inches long 1½ inch wide ligule short rounded. Spike short, peduncle ½ inch long covered with dry lanceolate bracts 1½ inch long. Flowers 4 ovary oblong pubescent ¼ inch long. Calyx tube 1¼ inch long pubescent at base apex long acuminate. Corolla tube long narrow ½ inch longer pubescent lobes oblong ½ inch ⅛ wide lip oblong rounded 1 inch long all white except the tip of the lip which is blue anther oblong crest moderately large. Stigma large cup-shaped.

Negri Sembilan at Bukit Tanga, Seremban (W. J. Napier).

7. E. LONGITUBA, Ridl. Trans. Linn. Soc. III. 382, Journ. Roy. As. Soc. S. Br. l.c. p. 156. Stem several feet tall. Leaves oblong lanceolate cuspidate 2 feet long 3 inches wide, narrowed and inaequilateral at the base, glabrous above woolly pubescent beneath, petiole 1 inch long pubescent. Flowering stems very long far creeping ¼ inch thick and eventually woody. Spikes numerous ½ inch apart. Bracts (sheathing leaves) oblong cuspidate 2 inches long. Flowers in pairs. Calyx tube 2 inches long slender apex ovate 3 toothed. Corolla tube ¼ inch longer lobes oblong obtuse rosy 1 inch long ¼ inch wide. Lip obovate crenulate 1½ inch long white tip yellow, 4 pink lines in the centre. Filament narrow pubescent, crest 4 toothed. Capsule 1 inch through globular white.

Pahang: Tahan River (Ridley 2403); Selangor: Gunong Hitam (Goodenough). Upper Perak at 3000 feet elevation (Wray 3586). In dense forests. Endemic.

15. GEOSTACHYS, Ridl.

Rhizome stout woody not subterranean. Leafy stems 2-3 feet tall. Leaves lanceolate cuspidate glabrous. Peduncles lateral decurved, rarely erect. Flowers secund, 2 or 3 in a dry papery brown bract on a short peduncle. Calyx tubular with an ovate cuspidate limb. Corolla tube shorter thick, lobes oblong as long as the tube. Lip entire obovate as long. Staminodes none. Stamen short. Anther linear with a small rounded crest. Capsule orange or red elongate or globose. Species 5 or 6. Endemic.

Scapes decurved	
Flowers 4 together in each bract ...	1. *G. secunda.*
Flowers 2 together in a bract.	
Lip obcuneate entire	2. *G. decurvata.*
Lip 3 lobed	3. *G. Penan ensis.*
Flowers 1 in each bract	4. *G. rupestris.*
Scapes erect	5. *G. elegans.*

1. G. SECUNDA, Ridl. l.c. 158. Stems stout and tall. Leaves over 12 inches long 1½ inch wide narrow lanceolate glabrous, petiole 1 inch long, ligule ⅝ inch. Scapes deflexed 6 inches long, base covered

with large dry lanceolate acute sheath leaves 2 inches long pubescent, rachis and pedicels hispid. Flower spikes numerous crowded secund, pedicels ½ inch long, flowers 4 in a spike. Bracts ovate lanceolate cuspidate pubescent 1 inch. Calyx spathaceous with a long cusp. ¼ inch long. Corolla tube shorter lobes oblong lanceolate ½ inch. Lip oblong obtuse longer. Filament short. Anther linear no crest.

Alpinia secunda, Bak. l.c. 257.

Perak, (Scortechini 381). Bujong Malacca (Ridl. 9785).

2. G. DECURVATA, Ridl. l.c. 158. A large tufted plant with a stout rhizome. Stems stout 4-5 feet tall. Leaves lanceolate acuminate 18 inches 3 inches across, glabrous, petiole 2 inches ligule oblong ovate ½ inch long. Scapes deflexed 12-14 inches long, base covered with long dry sheaths. Flowers secund 20, on pedicels ½ inch long in hairs enclosed in boat-shaped sheaths. Bracts at base ½ inch long lanceolate acute. Calyx spathaceous as long as the corolla tube. Corolla lobes lanceolate obtuse half an inch long buff. Lip 1 inch obcuneate oblong apex rounded buff. Filament linear. Anther linear crest small rounded. Capsule elongate glossy dark red.

Alpinia decurvata, Bak. Fl. Brit. Ind. VI. 257.

Perak, Larut Hills (Ridley 5189). (King's Coll. 6310). Woods at an elevation of 3000 and upwards.

3. G. PENANGENSIS, Ridl. l.c. 159. Rhizome stout woody. Stems about 3 feet tall slender. Leaves lanceolate narrowly cuspidate glabrous 12 inches long 1-1½ inch across petiole very short, ligule ovate obtuse ¼ inch long. Scapes deflexed secund 3 inches long rachis glabrous. Bracts slightly pubescent spathaceous brown enclosing a pair of flowers. Calyx spathaceous cuspidate 1 inch long. Corolla tube shorter red, lobes oblong obtuse ½ inch long. Lip nearly 1 inch long ½ inch wide trilobed side lobes short rounded midlobe obovate rounded ocreous yellow minutely pubescent. Anther oblong ¼ inch no crest.

Penang, Government Hill common at 200 feet alt. on dry banks. (Curtis 327) (Ridley 9336).

4. G. RUPESTRIS, Ridl. l.c. 159. Rhizome stout roots very long pubescent. Stems stout. Leaves broadly lanceolate cuspidate glabrous 8 inches long 1½ inch wide, petiole short. Scapes decurved 3 inches long bases covered with large dry sheaths, uppermost lanceolate acute 1 inch long. Flowers yellow secund solitary in the bracts on glabrous pedicels ¼ inch long. Bracts ovate 1 inch long. Calyx spathaceous limb ovate cuspidate pink ½ inch long. Corolla tube slender shorter, lobes oblong lanceolate ½ inch long. Lip obovate longer yellow with red marks. Filament short, anther crest small rounded.

Kedah, Gunong Jerai 3-4000 feet alt. (Ridley).

5. G. ELEGANS, Ridl. l.c. 160. Stems about 3 feet tall leaves narrow lanceolate acuminate 1 foot long 1 inch broad glabrous, petiole ¼ inch long, ligule ovate obtuse ⅛ inch. Scapes erect 1½ feet tall, base covered with dry sheaths, lowest ones obtuse 2 inches, upper ones acute, rachis pubescent. Panicle 5-6 inches long with flowers in pairs in an ovate bract, on a short peduncle outer bracts ovate mucronate pubescent. Calyx spathaceous brown. Corolla tube shorter ½ inch long lobes oblong obtuse buff. Lip obovate oblong retuse little longer. Filament very short. Anther oblong narrow emarginate, crest. Capsule orange globose ⅜ inch long glabrous.

Malacca: Mount Ophir (Derry 603, Ridley 3137). Common on rocks and the ground up to 4000 feet elevation.

16. ALPINIA, L.

Rhizome short aromatic. Stems tall leafy. Leaves lanceolate, shortly petiolate, ligule short. Panicles terminal, flowers numerous often showy. Bracts caducous often petaloid. Calyx tube short tubular. Corolla tube thick little longer, lobes linear or oblong. Lip large and convolute, or small narrow lobed or entire. Staminodes broad and spathulate, or reduced to narrow subulate processes or absent. Stamen long fleshy, filament thick, anther broad crest usually absent, well developed (section *Cenolophon*). Fruit globose or cylindric, yellow red or black, dehiscent irregularly. Seeds numerous black angled enclosed in a sweet aril, aromatic.

Species about 60. India, Malaya, Siam, China and North Australia.

§ 1. HELLENIA. Flowers small, white or pink. Lip narrow not convolute often bifid. Anther usually crested. Fruit small globose few seeded.

Lip entire obovate	1. *A. conchigera.*
Lip entire narrow oblong	2. *A. secundiflora.*
Lip bifid spathulate	3. *A. Galanga.*
Lip bifid lobes narrow no anther crest ...	4. *A. melanocarpa.*
Lip bifid lobes narrow anther crested ...	5. *A. scabra.*

§ 2. CATIMBIUM. Flowers large. Lip broad convolute, red and yellow. Anther not crested. Fruit globose large. Seeds numerous small, angled, in a sweet aril. Panicle or raceme erect lax; bracts oblong or boat-shaped.

Staminodes absent. Bracteoles small caducous	6. *A. mutica.*
Staminodes absent. Bracteoles large boat-shaped 1 inch	7. *A. assimilis.*

Staminodes absent. Bracteoles ovate ½ inch flowers small ... ... 8. *A. Murdochii.*
Staminodes subulate glabrous.
Corolla orange, raceme short ... ... 9. *A. Rafflesiana.*
Corolla white, panicle long.
Lip broader than long ... ... 10. *A. nobilis.*
Staminodes short blunt hairy.
Lip longer than broad ... ... 11. *A. latilabris.*
Inflorescence pendulous short, bracteoles cup-shaped.
Bracts oblong, panicle lax ... ... 12. *A. Javanica.*
Bracts broad ovate thin, panicle compact capitate ... ... 13. *A. capitellata.*

§ 3. CENOLOPHON. Flowers large. Lip not convolute flat, entire or lobed. Anther crested. Fruit oblong or fusiform, with few large seeds.

Raceme lax nodding ... ... 14. *A. petiolata.*
Raceme erect dense. Bracts linear.
Leaves unequally cordate at base ... 15. *A. macrostephanus.*
Leaves narrowed at base lanceolate ... 16. *A. vitellina.*
Leaves narrowed at base ovate ... ... 17. *A. cannaefolia.*
Raceme erect dense. Bracts connate, cap-shaped ... ... 18. *A. comosa.*

§ 1. HELLENIA.

1. A. CONCHIGERA, Griff. Notul. III. 424, l.c. Pl. As. T. 354. Rhizome aromatic slender. Stems crowded forming large tufts, about 2 to 4 or 5 feet tall slender. Leaves oblong glabrous, with a short point edges ciliate 6-12 inches long 1½-3 inches wide petiole ½ inch, ligule short rounded pubescent, panicle erect about a foot long with short branches. Calyx short thick with 3 triangular teeth. Corolla tube very short lobes white elliptic oblong white ¼ inch long. Lip obovate with 2 short teeth at the base yellowish white with 4 red streaks on each side, in the centre at the base is a retuse callus edged pink. Stamen yellow curved as long as the lip. Anther short elliptic. Capsule as large as a pea globose red. Bak. Fl. Brit. Ind. VI. 250, Ridl. l.c. 162.

Singapore: Galang (Ridley 10801); Johor: Kwala Sembrong (Kelsall, Ridley 4009); Pahang: Rumpin River (Ridley); Malacca: (Griffith), Umbai, Chenana putih; Province Wellesley: Kubang Semang (Curtis 2418); Perak: Kwala Kangsar (Ridley 2955), Wray 4028). Distrib. Chittagong. Native names "Lankwas Ranting," "Jurunang."

A decoction of the roots is used for rheumatism. Common in open country round villages, etc. Occasionally specimens occur with distinct subulate staminodes.

2. A. SECUNDIFLORA, Ridl. l.c. 165. Leaves lanceolate acute 18 inches long 2 inches wide glabrous glaucous beneath, petiole winged ½ inch long ligule ¼ inch long blunt. Panicle nearly a foot long, peduncle over 6 inches with several lanceolate sheathing bracts, the largest 6 inches long, branches ½ inch long pubescent. Flowers numerous secund. Bracts small ovate ½ inch long. Calyx 1 inch long, lobes 3 subequal ovate pubescent, mucronate. Corolla tube 1⅛ inch long narrow funnel-shaped, lobes oblong hooded. Lip shorter oblong obtuse rounded with 3 strong veins. Staminodes flat wing-shaped ending in a linear subulate point 1 inch long. Filament broad. Anther not crested.

Selangor, Bukit Hitam (Kelsall). Only once collected.

3. A. GALANGA, Sw. Obs. Bot. 8. A tall plant with a thick aromatic rhizome. Stems numerous stout about 6 or 7 feet tall. Leaves lanceolate acute 18 inches long 3¼ inches broad, petiole ¼ inch long, ligule as long entire. Bracts lanceolate acute ½ inch long. Panicle 6 inches long, flowers numerous fragrant, pedicels ¼ inch long pubescent. Calyx unequally trifid ½ inch long, lobes ovate white. Corolla tube as long, lobes linear recurved, ¾ inch long green. Lip 1 inch long spathulate, claw narrow light green with 2 low ridges, limb bifid white with red streaks. Staminodes 2 short processes pink. Stamen 1 inch long, filament broadly linear white. Anther notched at the top. Fruit ¼ inch long elliptic red, seeds 1 or 2.

Roxb. As. Res. XI. 252, Rosc. Trans. Linn. Soc. VIII. 345. Bak. Fl. Brit. Ind. VI. 253, Ridl. l.c. 163.

A. viridiflora, Griff. Notul. III. 423, Ic. Pl. As. t. 353.

A. alba, Rosc. Trans. Linn. Soc. VII. 346.

A. carnea, Griff. Notul. III. 420, *Maranta Galanga* L. Sp. Pl. 2.

Hellenia alba, Retz. Obs. VI. 18.

Languas Vulgare, Koen. Retz. Obs. III. 64.

Heritiera alba, Retz. Obs. VI. 18.

Commonly cultivated and occurring in waste ground all over the peninsula.

"Lankwas" of the Malays. The rhizome used in curries.

A. zingiberina, Hook. fil. (Bot. Mag. t. 6944) a native of Siam, seems quite distinct.

4. A. MELANOCARPA, Ridl. l.c. 163. Stems tufted 2 to 6 feet tall slender from a stout rhizome. Leaves lanceolate acuminate narrowed at the base, 6 inches long, 2 inches wide glabrous. Petiole ½ inch long, ligule as long entire. Panicle about 6 inches long with short branches ¼ inch long usually 3 flowered. Bracts very small lanceolate cuspidate

pink. Calyx nearly ½ inch long white. Corolla tube a little longer, lobes oblong obtuse white. Lip base narrow then dilate and bilobed, lobes oblong obtuse pink. Staminodes 2 small green teeth at the base of the stamen. Filament linear flat. Anther oblong fleshy retuse crestless. Capsule as big as a pea black or red.

Hellenia melanocarpa, Teysm. and Binn. Pl. Hort. Bogor. Cult. p. 328.

Singapore: Kranji, Seletar (Ridley); Pahang: Kwala Pahang (Ridley 1594).

Occurs in sandy places near the sea. It resembles *A. conchigera* Griff. but has fewer stems and the bifid lip easily distinguishes it. Native name "Munkanang;" a decoction of the flowers is administered in cases of cholera. Distrib. Sumatra.

5. A. SCABRA, Benth. Gen. Pl. III. 648. Stems 6 or more feet tall. Leaves lanceolate cuspidate 18 inches long, 2 inches wide dark green, (paler and scabrid when dry) petiole winged to the base ¼ inch long, ligule oblong truncate ¼ inch long. Panicle 2 feet long lower branches 6 inches long, upper ones short. Flowers small white on pedicels ¼ inch long. Calyx campanulate ¼ inch long 3 toothed. Corolla tube longer rather slender curved, lobes lanceolate oblong obtuse ¼ inch long, dorsal hooded, white. Lip shorter narrow deeply bifid, lobes linear oblong. Stamen filament slender linear, anther with a small crest. Capsule ⅓ inch through globose black.

Baker l.c. 256, Ridl. l.c. 164. *Hellenia scabra*, Bl. Enum. 60.

Johor: Gunong Pulai (Ridley); Selangor: Bukit Hitam (Kelsall 1982); Perak: (Scortechini), Larut Hills common (Curtis 2722). Hermitage Hill (Ridley 2958). BujongMalacca (Ridley); Kedah: Gunong Jerai (Ridley 7796).

In forests on the hills from about 1000 to 3000 feet altitude. Distrib. Java.

§ 2. CATIMBIUM.

6. A. MUTICA, Roxb. Fl. Ind. I. 67. Stems 3 to 6 feet tall usually slender. Leaves narrow lanceolate very acuminate at both ends glabrous, 18 inches across petiole 1 inch long, ligule ovoid blunt ¼ inch. Panicle 3 to many, flowered, with several short branches, rachis finely pubescent or nearly glabrous, a long caducous green bract encloses the whole inflorescence in bud. Bracteoles very small ¼ inch long oblong white caducous. Flowers in threes, pedicel ¼ inch long. Calyx narrow at base, dilate above, split about half way, teeth 3½ inch long white. Corolla tube shorter lobes oblong 1 inch long white, upper one oblong ovate. Lip indistinctly 3 lobed, apex truncate crisped orange with numerous red dots and veins, a dark red swelling at the base on each side Filament short. Anther thick ¾ inch long. Capsule globose

orange red minutely downy, dehiscent in three valves. Seeds numerous, black or dark grey with a sweet aril. Roscoe Scitam. Pl. t. 69. Ridley l.c. 165.

Pulau Aor and Pulau Dayong (Feilding).

7. A. ASSIMILIS, Ridl. l.c. 166. Stems about 6 feet tall. Leaves lanceolate acuminate narrow 1½ foot long 1½ inch broad glabrous dark green, petiole 1 inch long, ligule ¼ inch oblong blunt. Panicle 6 inches to a foot long, rachis pubescent, branches few and short. Bracteoles ovate white 1 inch long. Calyx ¾ inch long enlarged upwards 3 lobed, lobes short. Corolla tube short ¼ inch long, white upper lobe obovate obtuse 1 inch long, ¾ inch wide, lower ones smaller. Lip obovate obscurely 3 lobed 2 inches long 1½ inch wide midlobe rather short crisped orange thickly spotted and veined red, a pair of short conic fleshy pubescent processes at base. Ovary very pubescent. Capsule globose hispid orange.

A. mutica, Hook. fil. Bot. Mag. t. 6908. (not Roxburgh).

Singapore: (King's Coll. 1190) probably cultivated; Johor: Kota Tinggi (Ridley); Pahang: Pekan (Ridley 1218). Province Wellesley Ara Kudah (Ridley 7028) abundant near Prai, Sempang Ampat.

Penang, Batu Feringghi (Curtis 2766). Distrib. Malay Islands.

By rivers and in wet open swamps.

8. A. MURDOCHII, Ridl. Journ. Roy. As. Soc. S. Br. Vol. 44, p. 196. Stem over a foot tall. Leaves elliptic lanceolate acuminate base broad 7 inches long 2 inches wide very closely pubescent beneath petiole very short hairy ligule oblong truncate hairy sheath pubescent edges hairy. Raceme 4 inches long rachis and pedicels golden hairy pedicels ½ inch long. Bracteole broad ovate ½ inch long hairy outside. Calyx ½ inch long tubular lobes short ovate pubescent base hairy at the base. Corolla twice as long as the calyx tube shorter than calyx upper sepal oblong hooded with a thick blunt boss on the top, the other two narrower oblong obtuse all apparently yellow or white finely dotted with red. Lip shorter obovate three lobed side lobes broad truncate margins undulate midlobe narrower blunt bifid thickly dotted with red and with 5 elevated red ridges towards the tip. Filament short anther as long thick, emarginate and crestless at top. Staminodes none.

Selangor, Semangko Pass. February 1904. (A. M. Burn-Murdoch) and Ridley.

9. A. RAFFLESIANA, Wall. Cat. 6575, Baker l.c. 255. Stems slender 3 or 4 feet tall. Leaves lanceolate cuspidate pubescent 12 inches long by 3 wide, petiole ½ inch long, ligule oblong. Panicle short and compact 2-4 inches long. Bracts oblong short. Calyx short ½ inch long dilated upwards mouth oblique red. Corolla tube nearly twice as long lobes broadly lanceolate orange tipped red 1½ inch long.

Lip longer broadly ovate orange with darker veins. Staminodes 2 short toothed processes deep purple. Filament linear fleshy, anther retuse. Capsule globose green ¾ inch long pubescent.

Hook. Ic. Pl. 1963, Ridley l.c. 170.

Singapore: Changi, Tuas (Ridley 445) (Cuming 2400); Johor: (Ridley 4612). Batu Pahat (11196); Malacca: Sungei Hudang; Selangor: Bukit Hitam (Kelsall, Ridley 10,791); Perak: Larut Hills (Curtis 2074), Waterloo (Curtis 2985), Goping (King's Coll); Penang: (Porter, Wall. Cat. 6575).

Not rare and often abundant in woods from sea level to 4000 feet elevation. Native names " Pua Munkang, " " Tepus Kijoi." Endemic.

10. A. NOBILIS, Ridl. l.c. 169. Stems 6 to 12 feet tall 1 inch through pubescent. Leaves oblong cuspidate, base oblique 2 feet long 6 inches wide, glabrous above velvety pubescent beneath, petiole stout 1 inch long brown velvety, ligule an inch long bilobed. Raceme about a foot long enclosed in 2 very large sheaths. Bract 3 lobed 2 inches long and 3 across, white tipped carmine. Calyx 1 inch long 2 or 3 lobed white pubescent. Corolla tube shorter lobes oblong obtuse 1½ inch long 1 inch wide, silky hairy white. Lip 2½ inch long, 2 inches wide, cordate bilobed, lobes large oblong strongly crisped sides of lip and disc blood red with lines of yellowish white spots, apex lemon yellow nerves crimson a strong hairy keel runs at the base, with pustular elevations at the base of the stamen on each side. Filament ½ inch broad pubescent. Capsule round flattened at both ends orange stiffly hairy.

Pahang: Kwala Tembeling (Ridley); Selangor: Ginting Bida (Ridley 7795). Endemic.

11. A. LATILABRIS, Ridl. l.c. 168. Stems stout about 12 feet tall Leaves glabrous except the midrib petiole and ligule 2½ feet long 3 inches wide, narrowly lanceolate tapering at the base, petiole 1 inch. Panicle many flowered, rachis stout pubescent outer bracts oblong lanceolate 2 inches long 1 inch wide white tinted rose. Inner bract ampliate apex trifid 1½ inch long. Pedicels ¼ inch long white pubescent. Calyx dilate upwards white tipped with rose. Corolla tube as long, upper lobe oblong obtuse 1½ inch long, ¾ inch wide, laterals narrower and adnate to lip. Lip 1¾ inch long and nearly 2 inches across, cordate, lobes not distinct, apex narrowed shortly bifid, lobes spreading acute, orange densely spotted with red, central bar and veins at apex deep red edge yellow. Processes at base (staminodes) horn shaped ¼ inch long curved crimson, base darker. Filament broadly linear. Anther ¾ inch long. Fruit globose orange nearly glabrous.

Pahang, Pulau Datu, Pahang River (Ridley) on river banks. Endemic.

12. A. JAVANICA, Bl. Enum. Pl. Jav. Ed. II. 59. Stems about 6 feet tall, ½ inch through. Leaves oblong cuspidate 18 inches long by 6 inches wide glabrous above pubescent beneath, petiole 1½ inch long pubescent ligule bifid to the base, lobes oblong truncate edges hairy. Panicle pendulous. Bracts oblong white, turning brown quickly. Bracteoles cup-shaped white ½ inch long encircling 2 or 3 flowers. Calyx ¾ inch long dilate upwards glabrous, tubular almost entire. Corolla tube thick, upper lobe oblong prolonged to a blunt point 1½ inch long, lateral lobes shorter, white pubescent, apex hooded. Lip ovate broad trumpet shaped edges denticulate, 2 inches long 1½ broad orange with crimson spots and veins at the base edge white. Staminodes irregular with 2 or 3 points crimson. Stamen filament pubescent. Anther very thick ½ inch long. Capsule globose green.

A. involucrata, Griff. Notul. iii. 422, Bak. Fl. Brit. Ind. VI. 256, Ridl. l.c. p. 171.

Costus Malaccensis, Koen. Retz. Observ. iii. 71.

Johor: Gunong Panti (Ridley); Malacca: Ayer Panas (Griffith) Ayer Panas (Derry 1185), Bukit Bruang (Derry 439), Sungei Hudang (Ridley 3121); Negri Sembilan: Tampin Hill (Goodenough 1847); Muar: (Curtis 2391); Selangor: Ulu Selangor (Ridley 10630). Bukit Bintang (Goodenough) 10513); Perak: Larut, Ipoh (King's Coll. 2296), Waterloo (Ridley 2954).

var. with calyx, tips of corolla lobes and centre of lip red.

Perak: Kinta Valley, Ipoh, Telok Pinang (Ridley 9697). Thickets and edges of woods. Native names "Poko Gingin" and "Kantan hutan." Distrib. Sumatra.

Baker suggests that this may be a variety of *A. nutans*, Rosc. but it is an utterly dissimilar plant. Schumann l.c. states that it is the plant intended by Blume under his *A. Javanica*, of which he has seen the type.

13. A. CAPITELLATA, Jack. Malayan Miscellanies, Hook. Journ. Bot. i. p. 360. Stems over 6 feet tall 1 inch or more through purplish brown pubescent. Leaves oblong cuspidate edges pubescent 2 feet long 4 inches wide, petiole 3 inches or less pubescent, ligule large hairy. Inflorescence capituliform obconic nodding 4 inches across with very large thin ovate cuspidate bracts 3 inches long and wide. Bracteoles short cup-shaped. Flowers almost sessile. Calyx ½ inch long much dilated upwards, obscurely 3 lobed, lobes tipped red blunt. Corolla tube a little longer upper lobe 1 inch long ¾ inch wide hooded, white with a conic mucro red, lateral lobes obovate blunt with a red boss near the tip. Lip obovate tip bifid edges crisp 1½ inch long 2 inches wide edge white centre orange thickly dotted with dark red. Staminodes adnate to the edge of the lip and base of filament subacute deep brown. Stamen 1 inch long, anther broad and thick yellow with pink dots on the back. Capsule globose green minutely pubescent.

Ridl. l.c. 172. Province Wellesley: Ara Kudah (Ridley 7014); Dindings: Gunong Tungul (Ridley 7227). Endemic.

§ 3. CENOLOPHON.

14. A. PETIOLATA, Baker Fl. Brit. Ind. VI. 255. Stems about 3 feet tall. Leaves few elliptic oblong narrowed at the base, acuminate glabrous about 15 inches long and 4 inches wide petiole 3 inches long, ligule ¼ inch. Raceme pendulous slender 6 inches long, about 20 flowered pedicels very short. Bracts narrowly linear ¼ inch long. Calyx ½ inch long 3 lobed lobes acute white shining, glabrous tipped with hairs. Corolla lobes oblong linear 1 inch yellowish white pubescent. Lip flat obovate edges crisped 1½ inch base yellowish apex orange with red veins central bar red. Staminodes 0. Stamen filament oblong. Anther broader, crest reniform undulate dentate emarginate. Fruit fusiform 2 inches long, hairy.

Ridley l.c. 175. Selangor: Bukit Kutu (Ridley); Perak: Larut Hills (Curtis). Gunong Horan (Scortechini 697) (Kunstler). Endemic.

15. A. MACROSTEPHANUS, Ridl. l.c. 175. Stem very slender 4 to 8 feet tall. Leaves narrowly oblong base rounded cordate, lobes very unequal, apex acuminate glabrous 2 feet long 3 inches wide petiole slender 5 inches long. Spike 3 to 4 inches long, peduncle long erect enveloped in the sheath of the topmost leaf. Bracts caducous, ovary villous. Calyx ¼ inch long dilated bilobed, lobes rounded pubescent. Corolla tube shorter slender, lobes linear minutely pubescent ¾ inch long. Lip oblong obtuse rather narrow a little longer edges crisped. Staminodes short linear obtuse. Filament rather slender. Anther hairy, crest very large 3 lobed, lobes truncate plicate.

Amomum macrostephanum, Bak. Fl. Brit. Ind. VI. 243.

Perak, Larut Hills 500 to 1000 feet alt. (King's Coll. 1905). Endemic.

16. A. VITELLINA, Ridl. l.c. 173. Rhizome stout short branched. Stems numerous 3 to 3½ feet tall, ½ inch through flattened. Leaves lanceolate acuminate 10 inches long, 3 inches across, petiole less than half an inch long, ligule ½ inch long usually split edged with red fur. Panicle erect with few branches much shorter than the leaves, 4 nches long rachis pubescent. Bracts narrow linear caducous 3 inches long green. Flowers sessile. Calyx 1 inch long pubescent green trifid. Corolla tube as long yellow, lobes linear blunt 1 inch long. Lip longer flat oblong cuneate bifid at tip edges crisped, orange veined darker, sprinkled with red dots. Stamen shorter than lip orange, anther oblong upper corners prolonged crest very large three lobed, toothed. Staminodes two short horn-like processes red.

Cenolophon vitellinum, Horan. Prodr. 36.

Amomum vitellinum, Lindl. Journ. Hort. Soc. ii. 245, Bot. Reg. 1847, t. 32.

Johor: Batu Pahat (Ridley); Selangor: Dusun Tua (Ridley 7792); Penang Hill: (King's Coll. 1719) (Ridley 7237).

In dense forest to about 2500 feet alt. rather rare. Endemic.

A specimen labelled *A. Wrayi*, King's Coll. 1719, belongs to this species, but the *A. Wrayi* Bak. Flor. Brit. Ind. VI. 254, from Penang Hill is classed with the crestless alpinias and compared with *A. calcarata*, and can hardly be the same thing.

17. A. CANNAEFOLIA, Ridl. l.c. 174. Stem stout 4 or 5 feet tall. Leaves ovate or oblong ovate narrowed at the base apex broad cuspidate glabrous 12 inches long, 6 inches wide, petiole 4 inches long. Raceme erect 6 inches long, peduncle 12 inches or less pubescent, Bracts linear lowest one 12 inches long ¼ inch wide green persistent. Flowers numerous very shortly pedicelled. Bracteoles very small. Calyx dilate trilobed pubescent ½ inch long, lobes blunt hairy at tips. Corolla tube slender, lobes linear blunt 1 inch long. Lip more than 1½ inch oblong entire crisped. Staminodes 0. Stamen 1 inch filament broadly winged pubescent. Anther narrow crest 3 lobed, median much the largest oblong crisped. Fruit oblong pubescent. Seeds 2 or 3 only oblong ¼ inch long smooth black.

Selangor: Dusun Tua (Ridley); Negri Sembilan: Bukit Sulu; Gunong Berumbun (Cantley's Collector).

In woods rare. Native name "Pua Minyak." Endemic.

A decoction of the roots and leaves used in fever.

18. A. COMOSA, Ridl. l.c. 170. Stems slender 6 to 10 feet tall slender. Leaves narrow lanceolate acuminate cuspidate, edges serrate, with short stiff hairs at the tip 12 inches long, 1½ to 2 wide, petiole 0, ligule very short rounded. Raceme about 6 inches long dense rachis pubescent. Bracts conical cup-shaped acute white falling off before the flower opens. Flowers numerous. Calyx spathaceous white ½ inch long. Corolla infundibuliform white a little longer, lobes oblong pubescent ½ inch long upper one hooded. Lip ¾ inch long, sides broad upturned, apex narrow minutely bifid pubescent, median bar thickened fleshy, white base pale yellow, with a bar of deep crimson dots on each side. Staminodes ⅛ inch long spathulate apex broad rounded white with a patch of deep crimson dots. Filament linear ⅛ inch, anther ¼ inch long, crest oblong rounded small, pubescent. Capsule cylindric ribbed brownish yellow, 2 inches long ½ inch thick.

Kedah, Gunong Jerai, in forests (Ridley 4443). Endemic.

EXCLUDED SPECIES.

Alpinia Allugas, Roscoe. *A. calcarata*, Rosc. *A. bracteata*, Roxb. *A. nutans*, Rosc. *A. malaccensis*, Rosc. all mentioned as occurring in

Malay Peninsula by Baker in Fl. Brit. Ind. without locality or collector's name. I have seen nowhere any specimens wild or cultivated in the Peninsula except the last two occasionally occurring in gardens.

§ 2. MARANTACEAE.

Herbs or shrubs, rhizome woody or tuberous not aromatic. Leaves ovate, oblong, or lanceolate petiolate, with a knee at the apex of the petiole. Inflorescence spicate, racemose or panicled. Bracts stiff often persistent. Flowers medium sized or small, fugacious. Sepals free subequal. Corolla base tubular, lobes free upper one usually largest. Fertile stamen one with a petaloid filament and one linear anther cell. Staminodes petaloid connate below, hooded. Style very stout strongly involute, ovary 1-3 celled, cells one ovuled embryo curved. Fruit capsular or baccate seeds one to three, globose or oblong usually arillate.

Species upwards of 300 all tropical countries but chiefly American.

Stems erect shrubby branched. Panicles subterminal ... ... 1. *Donax.*

Stemless plants.

Bracts imbricate, spikes elongate.

Spikes solitary rarely 2 or 3 from the rhizome ... ... 2. *Stachyphrynium.*

Spikes panicled from the side of a petiole 3. *Phacelophrynium.*

Bracts not imbricate, spikes very short in a head from the side of a petiole ... 4. *Phrynium.*

1. DONAX, Lour.

Stems tall shrubby much branched. Leaves ovate or oblong, petiole short, no ligule, sheaths long. Panicles erect or pendulous. Bracts narrow lanceolate. Flowers small white. Sepals narrow. Staminal tube cylindric. Staminodes obovate unequal. Ovary 3 celled, cells 1 ovuled. Style stout incurved. Fruit dehiscent or indehiscent, 1-3 seeded globose or trigonous. Seeds subglobose aril lacerate.

Species 3. Indo Malayan.

Schumann in Pflanzenreich IV. 48 *Marantaceae* separates this genus into three :—*Donax*, Lour., *Actoplanes*, Schum., and *Clinogyne*, Benth., the latter genus including the African species. I do not think it advisable to separate the three Indian species of *Donax* generically, but if so the *Donax grandis* (*Actoplanes grandis*, Schum.) should be *Clinogyne grandis*, Benth., as it is one of the three types of Bentham's *Clinogyne*. *Actoplanes* is distinguished by its globose indehiscent capsule and exarillate seed. The fruit of *Donax* is stated by most observers to be indehiscent and is not tricoccous in *D. virgata*. The only

other character seems to be the perispermic canal single in *Donax* double in *Actoplanes*, hardly sufficient to separate the genera. D. GRANDIS, Ridl. l.c. 176.

A very tall plant growing 15 feet or more tall. Stems smooth green, branched clustered and jointed on a thickened portion of the stem spirally. Leaves ovate acute 12 inches long, 6 inches wide base rounded glabrous, petiole 1 inch long, sheaths 6 inches. Racemes slender hanging from the upper leaf-axils, 12 inches long, rachis slender zig-zag. Bracts narrow lanceolate acute. Flowers rather distant. Sepals lanceolate acuminate $\frac{1}{8}$ inch long white pubescent. Corolla tube $\frac{1}{4}$ inch lobes lanceolate acute as long. Lip yellow oblong obovate obtuse with a large ridge towards the base. Petaloid staminode oblong, cucullate one broad with a large curved side lobe, antheriferous one very narrow linear. Style short. Fruit globose. *Clinogyne grandis*. Benth. and Hook. fil. Gen. Pl. III. 65, Bak. Fl. Brit. Ind. VI. 258.

Maranta grandis, Miq. Fl. Ind. Bat. Suppl. 616. *Actoplanes Ridleyi*, Schum. Pflanzenr.

Singapore : Bukit Panjang (Ridley 86) Bukit Timah (Hullett 440) ; Johor : Sugei Ulu Sembrong (Kelsall) ; Malacca : Bukit Panchur (Goodenough 1242), Sungei Hudang (Derry 122) ; Negri Sembilan : Tampin (Goodenough 1961) ; Pahang : Tahan River, Pulau Tawar (Ridl. 2402) Kwala Tembeling (Ridley 2402) ; Selangor : Kwala Lumpur Caves, Rawang (Ridley 10490) ; Perak : (Scortechini) Larut Hills (Curtis 2071); Dindings : Telok Sera (Ridley 7221) ; Province Wellesley, Krian (Ridley 9387). Distrib. Tenasserim, Andamans, Sumatra, Borneo, Siam.

" Bemban " of the Malays. The stems are used for making baskets. Inhabits forests.

Schumann is in error in stating of *Actoplanes Ridleyi*, that the fruit is " flava di vel tri rarissime monosperma." It is quite white and very rarely even 2 seeded. I have never seen it with three seeds. The only two seeded plant I have seen is the No. 2401, 2402, of my collection in Pahang, which has smaller leaves and indeed may be distinct species, but I could get no flowers. The Eastern Archipelago plant, *Actoplanes Canniformis* of Schumann *Maranta Tonchat* Bl. may be distinct, but it seems chiefly to differ in the size of its leaves and panicle. *Maranta grandis* Miq. the plant on which *Clinogyne grandis* Benth. was based is obviously the plant of the peninsula, as Miquel distinguishes it from *Maranta tonchat* Bl. by that very character.

D. ARUNDASTRUM, Lour. Fl. Cochinensis, p. 15.

Stems numerous about 8 feet tall nearly an inch through, branches dichotomous thickened at the base. Leaves elliptic base rounded apex acute petiole $\frac{1}{4}$ inch long. Panicle erect or suberect 2 to 8 inches long, branches few zig-zag. Bracts lanceolate green acute. Flowers in pairs white on short pedicels with a yellow conic gland below the

ovary. Sepals spathulate, upper one 1½ inch long ¼ inch wide at top, lower ones narrower more acute adnate to the corolla tube for ½ their length. Petals linear obtuse. Lip small spathulate bilobed with a tongue-shaped process in the mouth and a line of hairs down the centre. Petaloid stamen 1½ inch long bilobed, ½ inch across at tip, antheriferous stamen adnate to lip. Cucullate stamen bilobed at apex. Fruit 3 seeded and three lobed obconic or rarely globose one seeded.

Schumann Pflanzenr. Marantac. 33, Ridl. l.c. 177.

Clinogyne dichotoma Salisb. Trans. Hort. Soc. I. 276, Benth. and Hook. fil. Gen. Pl. III. 651, Bak. Fl. Brit. Ind. VI. 258.

Phrynium dichotomum, Roxb. As. Res. XI. 324, Fl. Ind. I. 2, *Maranta ramoissima*, Wall. Pl. As. Rar. t. 286, *M. arundinacea*, Blanco. Fl. Filip. ed. I. 7, (non L).

Johor: Kota Tinggi (Ridley); Pahang: Pekan, Banks of Pahang River; Selangor, Langat (Ridley); Perak: Kinta River (King's Coll. 381); Kelantan: Kamposa (Ridley). Distrib. India, Siam, Malay Islands.

A smaller plant than *D. grandis*, but with larger flowers. River Banks. Native name "Bemban Ayer."

2. Stachyphrynium, Schum.

Rhizome short. Stems numerous. Leaves trifid long petioled often large. Inflorescence simply spicate sub-sessile or pedunculate rarely branched. Bracts imbricate. Flowers in pairs in the bracts enclosed in a thin bracteole. Sepals narrow. Corolla tube longer, slender, lobes oblong. Staminal tube a little longer, or as long. Pataloid stamen entire or bilobed, cucullate short. Lip oblong or ovate with a narrow crest, hairy or lamellar. Style stout curved. Capsule oblong 2 or 3 seeded. Seed oblong with a small irregular aril, or with two long claw-shaped processes.

Species 8. Indo-Malayan.

Spike flattened, bracts distichous	1. *S. Griffithii.*
Spike fusiform. Leaves large 6 feet tall ...	2. *S. cylindricum.*
Spike fusiform. Leaves about 1 foot	3. *S. Jagoranum.*
Spike small oblong. Leaves small	4. *S. minus.*

1. S. Griffithii, Schum. Pflanzenr. Marantaceæ, p. 49. Very large tufted plant. Leaves erect petiole slender 3 feet or more, blade oblong subacute 2 feet long 6 inches wide, light green above, glaucous except one edge beneath. Spikes 4 to 6 inches long flattened 3 inches wide, on peduncles as long. Bracts whitish edges connate at the base points recurved 2 inches long 1½ inch wide. Flowers in pairs enclosed in a thin white bracteole shortly pedicelled white fragrant. Calyx lobes

narrow acuminate. Corolla tube slender longer ½ inch long, lobes oblong lanceolate nearly as long. Staminal tube a little longer. Petaloid stamen deeply cleft, lobes rounded broad. Cucullate narrow side lobes blunt, edges yellow. Lip oblong obovate, crest parallel with the lip a hairy ridge below. Capsule 1 inch long fawn coloured oblong keeled in front. Seeds 2 oblong aril small irregular.

Phrynium spicatum, Griff. Notulae III. 418. (non Roxburgh).

Ph. Griffithii, Bak. Fl. Brit. Ind. Ind. II. 260, Ridley l.c. 178.

Hitchenia musacea, Bak. l.c. 225.

Singapore: Bukit Timah (Ridley 4610), Bukit Mandai (Ridley 444) (Wallich 6956 *Curcuma musacea*); Johor: Gunong Panti, Batu Pahat (Ridley); Malacca: Ching (Griffith), Bukit Bruang. Negri Sembilan, Fampin Hill (Goodenough 1900); Pahang: Tahan River (Ridley). Abundant in dense woods. Endemic.

2. S. CYLINDRICUM, Schum. l.c. 49. Plant of the habit of the preceding. Leaves petiole 4 feet long, blade oblong ovate, base broad 2 feet long, 8 inches wide, whitish beneath. Peduncle 8 inches long. Spike narrow cylindric fusiform 6 inches long (occasionally 2 on the peduncle). Bracts pale green ovate oblong truncate, tips erect. Flowers white. Sepals lanceolate acute reddish ¼ inch long. Corolla tube 1 inch dilate above lobes lanceolate acute. Cucullate stamen short truncate tipped yellow. Petaloid hooded. Lip fleshy ovate acute with a slanting pubescent bar across.

Phrynium cylindricum, Ridl. l.c. 178.

Perak: Ipoh and Kwala Dipang on limestone rocks. (Ridley 9787, Curtis 3318). Endemic.

3. S. JAGORANUM, Schum. l.c. 48. Leaves solitary 2 or 3 together petiole 8 or 9 inches, blade oblong cuspidate 6 to 7 inches long 3 inches across glabrous except the pubescent midrib and knee of petiole, grey green with or without darker patches. Spike fusiform slender 2 inches long, peduncle 1 inch. Bracts about 4 lanceolate acute. Sepals lanceolate acuminate green. Corolla tube long slender ½ inch long white, lobes short oblong yellow. Staminal tube no longer. Cucullate stamen nearly entire oblong with a lateral process, tipped orange. Antheriferous one petaloid with a rounded process on the inside and and a linear lobe outside. Capsule oblong oblique green. Seeds 2 elliptic oblong brown, aril reddish with 2 long claws.

Phrynium Jagoranum, Kolb. Wochenschr. VI. p. 358, Ridley l.c. 179.

Calathea Jagoriana, Regel Gartenfl. XXVIII. 297.

Selangor: Dusun Tua (Ridley 7793); Kwala Lumpur: Perak (Wray 3577). Endemic.

4. S. MINUS, n.sp. Rhizome long creeping slender $\frac{1}{6}$ inch through yellow, stems about three inches long of 3 or 4 leaves, crowded petioles terete erect slender 18 inches long, knee $\frac{1}{4}$ inch long, blade lanceolate acuminate narrowed at the base into the petiole 8 inches long $1\frac{1}{2}$ inch wide dark green above paler beneath. Peduncle slender about 3 inches long from the base of the axil of one of the leaves. Capitulum about an inch long. Bracts lanceolate mucronulate reddish minutely scabrid on the back at the tip. Flowers small white. Calyx lobes lanceate acuminate translucent $\frac{1}{4}$ inch long. Corolla tube slender white $\frac{1}{2}$ inch long a little dilated towards the tip, lobes oblong lanceolate obtuse $\frac{1}{2}$ inch long. Petaloid deeply bifid, lobes broadly subtriangular dilated at the top. Cucullus shorter with a short lateral deflexed lobe, tip edged with yellow. Stamen as long, oblong, anther cell thick walled, pollen white globose. Lip oblong fleshy truncate with a strong horn-like process on one side. Style stout.

Singapore, Reservoir Woods. In flower in June 1906. (Ridley).

This grows in masses on the ground in rather dry woods. I believe I have seen it elsewhere in the peninsula but not in flower.

3. PHACELOPHRYNIUM, Schum.

Tufted herbs, with long petioled leaves. Inflorescence a dense or interrupted panicle of spikes with distichous bracts from a petiole. Floweds in pairs or threes pedicellate. Bracteoles 2 to each flower Sepals linear or subovate. Corolla tube short or very short, lobes oblong. Lip with an oblique villous ridge. Petaloid stamen spathulate or obovate. Cucullate short. Ovary 3 celled. Capsule three angled 3 rarely 2 seeded. Seed 3 angled.

Species 6. Nicobars and Malay Islands.

P. tapirorum, Schum. Pflanzenr, Marant. 122. A large tufted plant. Leaves petiole 4 or 5 feet long, blade ovate lanceolate 18 inches long 8 inches wide acuminate glabrous. Peduncle stout about a foot long. Spikes 2 or 3 together, in a tuft, tufts rather distant, about 4 inches long. Bracts ovate lanceolate brown 1 inch long. Flowers in threes shortly pedicelled, 1 inch long enclosed singly in 2 thin bifid bracteoles, white. Sepals linear subulate more than $\frac{1}{2}$ inch long. Corolla tube rather thick dilated upwards lobes oblong blunt. Capsule oblong obtusely 3 angled $\frac{1}{2}$ inch long three seeded. Seeds narrow oblong.

Phrynium tapirorum, Ridl. Trans. Linn. Soc. III. 382, Journ. Roy. As. Soc. p. 180.

Selangor: Ginting Bidai (Ridley 7793); Pahang: Tahan River (Ridley 2398).

In forests at about 2,000 feet alt. Endemic.

4. PHRYNIUM, Willd.

Stemless herbs, with ovate or oblong leaves long petioled. Inflorescence capitate produced from the side of the petiole with a few large outer bracts, and containing numerous flowers 1 to 3 on short peduncles. Sepals linear, or oblong, corolla tube little longer, lobes oblong or ovate. Petaloid obovate. Lip usually shorter with a transverse callus. Cucullate short. Ovary 3 locular. Seeds 1-3, ellipsoid 3 angled with a thin dry aril, exocarp hard.

Species 12. Indo-Malayan.

Inflorescence from base of stem near the ground ... ... 1. *P. basiflorum.*
Inflorescence high up on the petiole near the blade.
Bracts very hairy ... ... 2. *P. hirtum.*
Bracts nearly glabrous ... ... 3. *P. Malaccense.*

1. P. BASIFLORUM, Ridl. l.c. 182. Rhizome rather long. Leaves tufted on a very stout short woolly stem, petiole tall slender, blade oblong with a broad base caspidate glabrous, with hispid margins Capitulum large 3 inches through from the base of the stem between the leaves dense. Outer bracts woolly. Inner bracts glabrous oblong lanceolate. Flowers in pairs. Sepals linear setaceous $\frac{3}{4}$ inch long. Corolla tube a little longer lobes oblong lanceolate $\frac{1}{2}$ inch long dark pink. Lip obovate broad $\frac{3}{8}$ inch long and broad, with a large rounded ridge. Stamen narrow. Ovary pubescent.

Negri Sembilan : Perhentian Tinggi (Ridley 10,000).

In damp woods growing in large masses. Endemic.

2. P. HIRTUM, Ridley l.c. 181. Leaf petiole stout 2 or 4 feet tall, blade broadly oblong acute 15 inches wide, 8 inches across, glabrous dark green. Young leaves with red backs. Heads 3 inches through, outer bracts 3 inches long or less, brown woolly lanceolate acute. Inner bracts oblong $1\frac{1}{2}$ inch long tips truncate broken up into fibres. Bracteoles lanceolate acuminate acute glabrous. Flowers $\frac{3}{4}$ inch long white. Sepals linear acuminate hispid longer than the corolla tube. Corolla tube rather slender lobes oblong lanceolate tipped with hairs. Lip oblong small. Cucullate staminode with rather a long lateral process. Capsule globose obscurely 3 lobed glabrous $\frac{1}{2}$ inch long. Seeds 3 large oblong.

Johor: Gunong Panti (Ridley); Sungei Ujong; Selangor: Dusun Tua (Ridley 7794); Pahang Track (Ridley 8740); Perak: Larut Hills, Hermitage Hill. Bujong Malacca (Ridley 9817) Ulu Kerling (King's Coll. 8771); Penang: Government Hill (Curtis. 2420); Kedah: Yan (Ridley).

Hill woods at about 2,000 feet alt. Native name "Lerek betina." Endemic.

3. P. MALACCENSE, Ridl. l.c. 180. A large tufted plant. Leaves numerous 3 feet long slender, blade 15 inches long 5 inches wide lanceolate cuspidate dark green above glaucous beneath, midrib covered with thick brown fur. Head lateral from the petiole 2 inches across, of about 5 branches. Bracts lanceolate acute stiff hard green glabrous $1\frac{1}{2}$ inch long $\frac{3}{4}$ inch wide. Flower spikes 5 or 6 on each branch, 2 or 3 flowers on each. Bracteoles lanceolate acute 1 inch long. Flowers small shortly stalked. Calyx lobes lanceolate acute hispid white nearly as long as the corolla tube. Corolla tube dilated upwards, lobes ovate blunt spotted purple. Lip spathulate oblong white, with a pink line across it. Cucullate staminode falcate spathulate white edged yellow, petaloid 1 obovate bilobed, antheriferous one linear. Capsule 1-3 seeded angled cordate $\frac{1}{4}$ inch long, red hairy. Seeds oblong angled black aril semitransparent.

Malacca: Panchur (Derry 295); Negri Sembilan: Tampin Hill (Goodenough 1948). Perhentian Tinggi (Ridley 10,001); Muar; Selangor, Kwala Lumpur (Ridley); Pahang: Kwala Tembeling (Ridley 2397); Dindings: Gunong Tungul (Ridley); Perak: Larut Hills.

Woods in the hill districts. Native name "Lerek." Endemic.

EXCLUDED SPECIES.

Phrynium capitatum, Willd. and *P. parviflorum*, Roxb. "Malay Peninsula" Baker in Flora of British India VI. 258, 259. I have seen no specimens of from our region.

P. variegatum, N. E. Br. Ill. Hort. XXXIII. 125, t. 206.

A plant of unknown origin, cultivated for many years in the Botanic Gardens, Singapore, and introduced into European cultivation n 1886, flowered in the Botanic Gardens, Singapore, and proved to bei a variety of *Maranta arundinacea*, the arrow root.

§ 3. CANNACEAE.

Canna indica var. *orientalis*, and *C. Warcewiczii*, have established themselves in villages and waste spots near towns, but have no claim to be considered natives of the peninsula.

§ 4. LOWIACEAE.

Stemless plants with petiolate lanceolate leaves. Inflorescence panicled from among the leaves with the dark purple lanceolate bracts. Flowers medium size to large. Calyx tube long cylindric nearly solid. Sepals 3 long lanceolate. Petals 2 small and 1 very large obovate.

Stamens 5 very short. Style 1 ending in a 3 armed stigma. Capsule large fusiform acute. Seeds numerous flask-shaped.

Genus 1. *Lowia*, with 3 species, one Borneo and 2 Malay Peninsula.

LOWIA, Scort.

Lip 4 inches long, trilobed	...	...	1. *L. longiflora.*
Lip 1½ inch long entire	...	...	2. *L. maxillarioides.*

1. L. LONGIFLORA, Scort. Nuov. Giorn. Bot. Ital. 1866, p. 308. Pl. 11. A large plant forming great tufts of lanceolate acute leaves 3 feet long, 4 inches wide narrowed into the petiole. Flowers solitary axillary. Bracts long sheathing purple. Calyx tube 3 inches long, sepals lanceolate acute 5 inches long 1 inch across purple. Petals 1 inch long linear acuminate yellowish. Lip clawed obovate 4 inches long and 2 inches across cream colour or lilac, claw purple apex trilobed side lobes rounded, medium oblong toothed. Stamens as long as the petals, filaments short curved. Style long and slender, stigmatic arms large linear with numerous processes at the end, rising from a cup-shaped body purple. Baker Fl. Brit. Ind. VI. 264.

Selangor: Ulu Langat; Kwala Lumpur Caves (Ridley 8169); Malacca; Perak: Kinta Valley (Scortechini). Native name "Lobak Hutan." Growing in large masses in damp spots in woods.

2. L. MAXILLARIOIDES, Hook. fil. Bot. Mag. t. 7351. Tufted plant. Leaves distichous lanceolate acuminate 8 inches long 3 inches across petiole 1-2 feet long base sheathing. Panicle about 3 inches long. Calyx tube purple 3 inches long. Sepals lanceolate acute 1¼ inch long deep purple. Petals very small oblong mucronate violet. Lip claw short blade oblong obtuse white tinted violet, 1½ inch long ½ inch wide. Filaments thick curved, anthers linear little longer. Style short and thick. Stigma obcordate with 3 short toothed arms. Capsule 1½ inch long fusiform acuminate 3 angled deep purple. Seeds ¼ inch long flask shaped brown hairy. Ridl. l.c.c. 194. *Protamomum maxillarioides*, Ridl. Trans. Linn. Soc. III. 383.

Pahang, Pulau Tawar Woods (Ridley 2399).

§ 5. MUSACEAE.

Arborescent herbs of large size. Leaves very large oblong petioled or not base sheathing. Flowers in a spike erect or decurved. Bracts large. Calyx tubular or of free sepals. Stamens 5 free, filaments linear or filiform. Anthers linear 2 celled. Staminode 1 or 0. Style slender, stigma 3 or 5 lobed, small. Fruit baccate or capsular. Seeds numerous or few.

Species about 60. Tropics.

Musa, L.

Stems of leaf sheaths convolute. Leaves oblong petioled or not. Spike nodding or erect. Bracts ovate coloured large herbaceous leathery. Flowers sessile several to each bract, lower ones female upper ones male. Calyx tubular 3 to 5 toothed split down one side. Corolla as long tubular. Stamens 5 perfect, the 6th rudimentary or absent. Filaments filiform, anthers linear erect 2 celled. Ovary 3 celled ovules many. Style filiform, stigma capitate, 6 lobed. Fruit an oblong berry, fleshy subtrigonous. Seeds angled numerous.

Species 35. Tropics of the old world.

Spikes decurved.

Bracts lanceolate brown ... ... 1. *M. Malaccensis.*

Bracts ovate yellow ... ... 2. *M. flava.*

Spike erect.

Bracts violet lanceolate ... ... 3. *M. violascens.*

1. M. Malaccensis, Ridl. Trans. Linn. Soc. ser. II. III. p. 383. Journ. Roy. As. Soc. S. Br. Vol. 32, p. 182. Stems rather slender 10 feet or more tall, 6 inches through. Leaves about 8 feet long often barred or splashed brown when young. Spike decurved, rachis covered with brown hairs. Bracts lanceolate subacute dark brown. Male flowers 1½ inch long curved white. Calyx boat-shaped with 5 teeth. Corolla oblong white ¾ inch long. Stamens with flattened filaments. Female flowers 16 in a row. Stamens ½ inch long abortive. Style thick 1 inch long. Fruit subcylindric 4 inches long yellow. Seeds black angled enclosed in sweet white pulp. Baker Kew Bullet. 1894, p. 249.

M. zebrina, Flowre des Serres t. 1061, 1062.

Common all over the hill districts. In woods, often in great abundance. Endemic.

Malacca: Panchur (Goodenough 1282), Ching; Pahang, Tanjong Gajah Mati, Pahang River (Ridley); Selangor: Kwala Lumpur (Ridley; Perak: Larut Hills (Ridley 2949). Kamuning (Machado). The Pisang Karok and Pisang Surong of the Malays. The fruit is quite eatable, through the pulp is scanty, and is an important foodstuff of the Sakais. The plant is probably one of the species from which some of the cultivated bananas are derived.

2. M. flava, Ridl. Trans. Linn. Soc. l.c. Journ. Roy. As. Soc. S. Br. Vol. 42, p. 183. Leaves large 16 inches across green. Spike decurved pubescent. Bracts broadly ovate obtuse 4 inches long, 1½ inch wide bright yellow. Male flowers 16 in a row shortly pedicelled. Calyx 1½ inch long with 5 equal teeth. Corolla ¾ inch long oblong mucronate. Females 16 in a row. Fruit about 2 inches long 5 angled.

Pahang, at Pulau Tijau, Pahang River (Ridley). Endemic.

3. M. VIOLASCENS, Ridl. Trans. Linn. Soc. l.c. 384, Journ. Roy. As. Soc. l.c. 183. Stems 8 to 10 feet tall rather slender. Leaves 10 inches across green above glaucous beneath transversely ribbed. Spike erect or nearly so bud apex acute. Bracts lanceolate narrow acute violet or white tinted violet, 9 inches wide often persisting and reflexed after the flowers have fallen rachis pubescent. Male flowers 6 in a row in each bract, about 1 inch long white. Calyx oblong, with 5 teeth, the outer 2 longest. Corolla $\frac{3}{4}$ inch long boat-shaped. Stamens linear. Female flowers 6 in one row. Fruit green 3 inches long 1 inch thick angled. Seeds $\frac{1}{4}$ inch long cylindric truncate not angled. Baker l.c. 257.

Common growing with *M. Malaccensis*, Pahang, Tahan Woods (Ridley 2394); Sungei Ujong: Linsum (Ridley); Selangor: Kwala Lumpur (common); Perak: Larut Hills. Distrib. Borneo.

V. AMARYLLIDEAE.

Herbs with a short stem, or a bulb. Leaves radical herbaceous. Scapes naked. Perianth superior tube long or short, or absent, lobes 6 subequal and similar. Stamens 6 adnate at the base of the lobes rarely epigynous, filaments slender free or connate, anthers linear erect or versatile. Ovary 3 celled, ovules many 2-seriate in the inner angle of the cells anatropous. Style short or long, stigma simple or trifid. Fruit capsular or baccate, loculicidal. Seeds few or many, albumen fleshy embryo small.

Tribe 1. HYPOXIDEAE. Rootstock thick, not bulbous. Flowers spicate or racemose.

Ovary not beaked. Fruit capsular ... ... 1. *Hypoxis.*

Ovary beaked. Fruit baccate ... ... 2. *Curculigo.*

Tribe 2. AMARYLLEAE. Rootstock bulbous. Flowers in umbells.

Leaves linear or lorate. Perianth lobes linear 3. *Crinum.*

1. HYPOXIS, L.

Stem tuberous. Leaves narrow basal, strongly nerved. Flowers yellow solitary racemed or umbllate. Perianth rotate sessile on the top of the ovary persistent. Stamens with short filaments, anthers erect dorsifixed. Style short columnar. Stigmas 3 stout, separate or connate. Capsule 3 valved or circumsciss below the top, not beaked. Seeds subglobose, testa crustaceous.

Species about 50. Chiefly African, also Australian.

H. aurea, Lour. Fl. Cochin-Chin. 200. A small hairy or villous herb with a cylindric or globose stem covered with fibres. Leaves linear acuminate 6 inches long $\frac{1}{4}$ inch wide ribbed glabrous. Scapes slender hairy $\frac{1}{2}$ to 4 inches long. Flowers 1 or 2 only on a scape,

slender hairy ½ to 4 inches long. Flowers 1 or 2 only on a scape yellow. Perianth lobes elliptic lanceolate backs hairy ½ inch long or less. Anthers sagittate. Capsule 3 valved clavate ¼-⅓ inch long. Seeds black tuberculate.

Baker Journ. Linn. Soc. XVII. 108, Kurz. Miq. Ann. Ludg. Bat. IV. 178, Hook. fil. Fl. Brit. Ind. VI. 277.

H. minor, Don. Prodr. 53, Royle. Ill. t. 91, f. 3.

H. Franquevillei, Miq. Fl. Ind. Bat. III. 586.

Curculigo graminifolia, Nimmo. Grah. Cat. Bombay Plants 215. Dalz. and Gibs. Bombay Flora 276.

Pahang. In open grassy spots at Pulau Manis. Pahang River (Ridley); Province Wellesley, Tasek Gelugur (Curtis). A very inconspicuous little plant growing among grass. Distrib. India, Java, China and Japan.

2. Curculigo, Gaertn.

Stem tuberous or a coated corm. Leaves lanceolate plicate, petioled or linear flat. Scape usually short. Flowers yellow, often unisexual, spicate racemed or subcapitate. Perianth base produced into a solid stipes above the ovary and bearing a rotate limb of 6 subequal lobes. Stamens ovary and seed of Hypoxis. Fruit baccate usually beaked.

Species about 12.

Perianth limb sessile on the ovary.
Spikes nodding ... ... 1. *C. recurvata.*
Perianth limb stipitate.
Spikes erect with large stiff oblong bracts 2. *C. villosa.*
Spikes erect, bracts ovate lanceolate or lanceolate acuminate.
Flowers ½ inch across. Fruit oblong 1 inch long ... ... 3. *C. latifolia.*
Flowers 1 inch across. Fruit club-shaped 2 inches long ... ... 4. *C. megacarpa.*

1. C. RECURVATA, Dryand. Act. Hort. Kew. Ed. 2, II. 253. Rootstock short and stout. Leaves about 6 feet long, blade plicate lanceolate acuminate 3 feet long, 6 inches wide. Scapes several, peduncles about 2 inches long flattened covered with brown hair. Raceme compact capitate usually decurved over 2 inches through. Bracts lanceolate acuminate, lower ones 3 inches long ½ inch across green edged and keeled brown with brown fur. Flowers bright yellow pedicels ¼ inch long stout, ovary flask-shaped furry, not beaked. Sepals and petals oblong ½ inch long, back of sepals and keel of petals furry. Stamens 6 filaments very short curved. Anthers connivent yellow

opening at the top only. Style longer. Stigma simple inaequilateral obscurely lobed. Fruit globose white hairy. Bot. Reg. t. 770, Roxb. Fl. Ind. II. 145. Benth. Fl. Austral. VI. 448, Miq. Fl. Ind. Bat. III. 585, Hook. fil. Fl. Brit. Ind. VI. 278.

Moliniera recurvata, Herb. Amaryllid. 841. Baker Journ. Linn. Soc. XVII. 120. Kurz. Ann. Mus. Bot. Ludg. Bat. IV. 175. *M. plicata* Colla. Hort. Ripping. App. II. 333, t. 18. *M. capitulata* Herb. l.c. *Leucojum capitulatum* Lour. Fl. Cochin-ch. 199.

Singapore: Tanglin, etc., (Ridley); Sungei Ujong: (Herb. B. G. Singap.); Perak: Larut Hills at 2000 feet alt. (Ridley). Distrib. India, Ceylon, Malay Islands, China and Australia.

Woods and open country common, Native name "Lumbah Merah." Fruits eaten by natives. A very beautiful variety of this with the upper side of the leaves silvery and the back purple has been found by Mr. Curtis at Ipoh in Perak.

2. C. VILLOSA, Wall. Cat. 5763, A. Kurz. Ann. Mus. Lugd. Bat. IV. 176. Leaves narrow lanceolate acuminate caudate plicate, stiff glabrous above cobwebby beneath 2½ feet long, 6 inches wide. Racemes erect 2 inches long on a short flat peduncle. Bracts stiff oblong acute apices recurved 2 inches long ½ inch wide or less glabrous green. Flowers ocre yellow ¾ inch across. Ovary with beak an inch long pubescent. Sepals lanceolate acute. Petals shorter and blunter. Stamens as in *C. latifolia*. Fruit long beaked greenish white. Seeds few black smooth and shining about half as large as those of *C. latifolia*.

C. latifolia var. *villosa*, Bak. Journ. Linn. Soc. XVII. 125, Hook. fil. Fl. Brit. Ind. VI. 280.

Singapore: (Wallich 5763 A). Tanglin, etc., (Ridley); Johor: Bukit Soga; Batu Pahat (Ridley). Distrib. Malay Islands.

Not rare in the south of the peninsula, growing among long grass and scrub in open country. The long acuminate leaves cobwebby beneath and the broad oblong recurved bracts like those of a *Curcuma* make it easily distinguishable. The beak of the fruit is as long as the ovary and very stout.

3. C. LATIFOLIA, Dryand. Act. Hort. Kew. Ed. 2, II. 253. Stem very short, or hardly any. Leaves lanceolate hairy on both surfaces 3½ feet long or less nearly 6 inches across plicate, petiole over 6 inches long. Spike erect on a peduncle 3 to 4 inches long, at first globose lengthening as the flowers open sometimes to as much as 6 inches. Lower bracts ovate acute greenish white ½ inch long. Flowers bright yellow ½ inch across. Ovary pubescent beaked. Perianth lobes oblong ¼ inch long. Stamens 6 rather short. Anthers splitting for their whole length. Fruit 1 inch long ovoid sparsely hairy

white. Seeds black rounded aciniform, longitudinally ribbed with minute papillae.

Baker Journ. Linn. Soc. XVII. 125, Bot. Mag. t. 2034, Bot. Reg. t. 754, Miq. Flor. Ind. Bat. III. 585, Hook. fil. Fl. Brit. Ind. VI. 280.

C. sumatrana, Roxb. Fl. Ind. II. 146, Lodd. Bot. Cab. t. 443, Wight Ic. t. 2042. *Molinieria sumatrana*, Herb. Amaryllid. 84. *M. latifolia* and *M. plicata*, Kurz. Ann. Mus. Lugd. Bat. IV. 176.

Singapore: Tanglin (Ridley 6940). Bukit Timah (Ridley 8044): Malacca: Pringit (Griffith); Selangor: Kwala Lumpur (Ridley 10174); Perak: Ipoh (Curtis 3364), Larut, (King's Collector 6405).

var. *glabrescens*. Leaves exactly lanceolate 1-1½ foot long 2 to 4 inches wide, petiole 2 to 8 inches long almost or completely glabrous. Raceme elongating to 2 inches. Bracts lanceolate hairy.

Singapore: Tanglin (Ridley); Malacca: Chabau (Ridley); Sungei Ujong: Tampin Hill (Goodenough); Pahang: Temerloh (Ridley); Dindings: Gunong Tungul (Ridley 7247); Province Wellesley: Bukit Juru (Ridley).

Distribution: Burmah, Andaman Islands and Malay Islands. Several other less distinct varieties might be made from this very variable plant, differing in the size of foliage, pubescence and length of raceme. The species is common all over the peninsula, and is known by the native name of "Lumbah," and in Pahang "Linsubah," small forms "Lumbah Padi." The sweet fruits are eaten by natives and have the peculiarity of causing every thing eaten or drunk for some time afterwards to possess a very unpleasantly sweet taste. The fibre of the leaves is used in some places for making nets, etc.

4. C. MEGACARPA, Ridl. Journ. Roy. As. Soc. S. Br. Vol. 41, p. 33. A large tufted plant with a stout stem. Leaves dark green oblong lanceolate acuminate glabrous 20 inches long 3 inches wide, petiole 8 inches long. Peduncle 4 inches long tomentose with large lanceolate acuminate bracts at the base, lower ones hairy on the edge only, upper ones more hairy. Spike broad conic cylindric 2 to 4 inches long. Flower 1 inch across. Sepals lanceolate acute ½ inch long, dirty yellow outside and hairy at the tip. Petals bright yellow. Stamens yellow, filaments short, anthers oblong. Ovary hairy beaked. Fruit 2 inches long Indian club-shaped ⅝ inch through at base white. Seeds very numerous angled, black, ribbed.

Perak, Larut Hills at 2-3000 feet alt. (Ridley). Endemic.

3. CRINUM, L.

Rootstock bulbous. Leaves long lorate or ensiform. Scape stout leafless solid. Flowers umbelled white. Bracts involucral lanceolate or ovate, floral linear. Perianth tube long slender lobes linea

or oblong spreading, subequal and similar. Stamens with slender filaments adnate to the throat of the perianth tube. Anthers linear dorsifixed. Style filiform. Stigma minute, ovules usually few. Fruit subglobose membranous or coriaceous bursting irregularly. Seeds few large rounded, testa thick. Albumen copious. Species 60. Tropics generally.

Bulb very large, leaves 3-6 feet, 5 to 6 inches across ... ... 1. *C. asiaticum.*

Bulb smaller leaves 2-3 feet by 3 inches across ... ... 2. *C. defixum.*

1. C. ASIATICUM, L. Sp. Pl. 419 (in part). Rootstock globose very large, neck stout 2 feet long 3 inches through. Leaves lanceolate dark green broad 2-6 feet long 5-6 inches wide thin. Scapes several stout 3-4 feet long. Involucral bracts ovate lanceolate 4 inches long 1-3 inches wide. Flowers numerous pedicels erect ¼-1½ inch long. Perianth tube green 3-6 inches long, lobes linear white 3½ inches long ⅜ inch wide. Staments 2½ inches long base white above dark pink. Anthers fuscous 1 inch long. Style filiform dark red. Fruit sub-globose with a leathery pericarp. Seeds large unequal 1 or usually 2.

Kunth. Enum. V. 547, Baker Handl. Amaryllidae 75, Herb. Amaryllid. 243, Bot. Mag. t. 1073, Hook. fil. Fl. Brit. Ind. VI. 280, Trim. Fl. Ceyl. IV. 271.

C. toxicarium, Roxb. Fl. Ind. II. 134, Wight. Ic. t. 2021, 2022, Lodd. Bot. Cab. t. 669.

Singapore: Changi; Sungei Buluh (Ridley 3600a); Johor: Tanah Runto (Ridley); Pahang: Pekan (Ridley 1659); Malacca: Pulau Besar (Maingay) Kundur (Griffith); Perak: Dindings (Ridley); Penang: Batu Feringi (Curtis 1274); Tringanu: (Ridley) Distrib. India, Ceylon, Malaya.

Common on the seashore growing in sand all round our coasts. Native name "Tembaga Suasa."

Hooker l.c. p. 284, suggests that Curtis' plant above-quoted may be *C. pedunculatum*, Br. of Australia, and states that this species differs from *C. asiaticum* only in the long pedicelled flowers, and "according to the Bot. Reg. in the elongated rootstock." The common plant here has always long pedicelled flowers and an elongate rootstock.

2. C. DEFIXUM, Ker. Quart. Journ. Sci. and Arts III. 105. Rootstock globose, neck 3-4 inches long. Leaves linear 2 feet long 4 inches wide. Scape stout 2 feet long slightly flattened green involucral bracts deltoid ovate acuminate 1½ inch long. Flowers erect about 12. Perianth tube 6 inches long slender greenish, ovary 1 inch long, lobes narrow linear acute reflexed white 3 inches long ½ inch wide. Filaments as long red. Anthers linear fuscous. Style rather longer

red. Fruit subglobose crowned with the persistent tube 1½ inch through purplish. Seeds flat ovoid elliptic green.

Herb. Amaryllid. 255, Kunth. Enum. V. 562. Bot. Mag. t. 2208, Lodd. Bot. Cab. t. 362, Baker Handl. Amaryllid. 76, Hook. fil. Fl. Brit. Ind. VI. 281, Trim. Fl. Ceyl. VI. 271. *C. asiaticum*, Roxb. Fl. Ind. II. 172. (not Linn). *Amaryllis vivipara*, Lam. Encyc. I. 123.

Pahang: Damp fields near the river at Renchong. Distrib. India Ceylon, Siam, Borneo.

VI. BURMANNIACEAE.

Small herbs often saprophytic. Stem usually short rarely tall. Leaves narrow linear green or reduced to scales white. Perianth superior tubular, with 3 sepals and 3 petals. Stamens 6 adnate to the tube, filaments very short. Anthers oblong 2 celled inflexed within the tube very various in form. Ovary obconic ovules very numerous. Capsule obconic opening by a lid. Seed minute not winged. Distribution all tropical countries.

§ 1. Non-saprophytic (*virentes*).

Leaves linear green	1. *Burmannia.* § 1.

§ 2. Saprophytic. Leaves reduced to scales.

Stamens 3, ovary 3 locular	1. *Burmannia.* § 2.
Stamens 3, ovary 1 locular	2. *Gymnosiphon.*
Stamens 6. Petals present	3. *Thismia.*
Stamens 6. Sepals connate by apices. Petals absent	4. *Bagnisia.*

1. BURMANNIA.

Saprophytic or non-saprophytic. Stem ascending or tuberous subterranean. Leaves linear acuminate green or reduced to white scales. Flowers solitary or racemose, blue or white. Perianth tube thin often broadly winged urn-shaped. Petals and sepals very small ovate. Stamens 3, filaments very short. Anthers reniform opening laterally. Style slender trifid. Stigmas heart-shaped. Capsule oblong or globose 3 celled, seeds fusiform. Species about 20. Tropical Asia, Africa and South America.

§ 1. Non-saprophytic (*virentes*).

Stem elongate with scattered leaves. Flowers few nodding	1 *B longifolia.*
Stem short leaves crowded at base. Flowers distichous secund racemose	2. *B. disticha.*
Stem short, leaves crowded at base. Flowers 1 to 6 crowded at the apex	3. *B. coelestis.*

§ 2. Saprophytic. Leaves reduced to scales.
Perianth tube winged.
Flowers numerous on long racemes ... 4. *B. gracilis.*
Flowers one or two at the apex of the stem.
Wings of perianth very narrow ... ... 5. *B. Wallichii.*
Wings of perianth broad oblong ... ... 6. *B. oblonga.*
Perianth tube cylindric not winged.
Rhizome tuberous ... ... 7. *B. tuberosa.*
Rhizome elongate covered with scale leaves 8. *B. Championii.*

§ 1. VIRENTES.

1. B. LONGIFOLIA, Becc. Malesia I. 244. Herbaceous plant 18 in. to 2 feet tall, rhizome creeping woody about 3 inches long. Leaves scattered at the base of the ascending portion (about 6 inches long) numerous grassy linear acuminate 8 inches long, ¼ inch wide. Stem about 8-16 inches long stiff erect, with 2 racemes of secund nodding flowers blue or white, half an inch in length on short pedicels. Bracts thin lanceolate acuminate white. Perianth tube dilate and winged at the base, narrowed upwards. Sepals lanceolate acuminate acute. Petals half as long blunt. Stamens with the connective bilobed above a central boss and a tooth below. Style arms short.

Hook. fil. Fl. Brit. Ind. V. 664.

Selangor: Bukit Hitam (Ridley 7653); Pahang: K'luang Terbang (Barnes H. B. S. 10902); Perak: Bujong Malacca (Ridley 9794). Gunong Bubu (Wray 3888); Larut Hills: Gunong Hijau (Ridley). (King's Coll. 5039). Gunong Batu Pahat (King's Collector 8040). Distrib. Borneo.

Inhabits mossy spots at an altitude of 3000 to 5000 feet.

2. B. DISTICHA, L. Sp. Pl. 287. Rhizome short and thick. Stem 1 to 2 feet tall erect seldom branched. Leaves ensiform acuminate 4-6 inches long ½-¾ wide, crowded at the base with a few sheathing ones above. Racemes opposite 2 or more terminal spreading 1-2 inches long many flowered. Flowers distichous secund erect 10-26 ½ an inch long, blue or white. Pedicels ¼ inch long. Bracts lanceolate acuminate ¼ inch long. Perianth tube broadly winged. Sepals ovate acute ⅛ inch long green. Petals narrower and thinner oblong linear blunt.

Roxb. Cor. Pl. III. t. 242. Hook. fil. Fl. Brit. Ind. V. 664. *B. distachya*, R. Br. Prodr. 264. *B. sumatrana* Miq. Fl. Ind. Bat. Suppl. 617.

Malacca: Mount Ophir (Ridley 3139, Derry 600); Kedah: Gunong Jerai (Ridley). Distrib. India, Ceylon, Sumatra, China, Australia.

The peninsular form has narrow more acuminate leaves than the Indian form and is the var. *sumatrana* Hook. fil. l.c.c.

3. B. COELESTIS, Don. Prodr. 44. Slender herb 3 to 12 inches tall, rhizome about 1 inch long. Leaves crowded at the base, lanceolate acuminate ¼-½ inch long, with a few scattered on the upper part of the stem. Flowers 1-6 terminal crowded very shortly pedicelled light blue, half an inch long. Perianth tube 3 winged for its whole length. Sepals and petals short ovate yellowish white the latter much the larger. Anthers sessile oval connective broad 2-crested above prolonged into a tooth below. Style slender trifid. Stigmas heart-shaped. Hook. fil. Fl. Brit Ind. V. 665.

B. azurea, Griff. Notul. III. 236, Ic. Pl. As. t. 272, f. 1, Beccari, Malesia 1, 242, t. 15, f. 1-3. *B. javanica*, Bl. Enum. Pl. Jav. I. 28, Miq. Fl. Ind. Bat. III. 614. *B. triflora*, Roxb. Fl. Ind. III. 117. *Cryptonema malaccensis* Turcz. Flora 1848, 1, 590. *Nephrocaelium malaccensis* Turcz. l.c. 1853, I. 287.

Singapore: Tanglin, Changi, etc., (Ridley); Malacca: Ayer Panas (Goodenough 1691), Sungei Hudang (Derry 1481); Pahang: Kwala Pahang (Ridley 1573); Penang: Telok Bahang (Curtis). Province Wellesley, Tasek Gelugur (Ridley 6997). Distrib. India, Siam, Labuan.

Grassy and sandy spots in open country common. Native names "Rumput Sisik Naga," "Rumput Jarum."

§ 2. SAPROPHYTICAE.

4. B. GRACILIS, Ridley Journ. Roy. As. Soc. Straits Branch Vol. 22, p. 335, (1890). A slender saprophyte 6-12 inches tall, branched. Leaves narrow lanceolate scale-like scattered on the stem. Racemes two opposite, terminal an inch or more long. Flowers about 14 secund erect white, pedicels ¼ inch long. Bracts oblong obtuse ⅛ inch long. Perianth tube ¼ inch long winged with broad semi-elliptic wings for its whole length. Sepals small lanceolate, petals much smaller, short and blunt. Style rather long, stigmas reniform. Capsule urn-shaped seeds fusiform acute at both ends.

Lankawi Islands, Terutau (Curtis 2123, 2590). Distrib. S. W. Siam.

Occurs on limestone rocks, beneath trees.

5. B. WALLICHII, Hook. fil. Fl. Brit. Ind. V. p. 666. A very slender saprophyte 4 to 5 inches long white with a slender branched rhizome with ovate lanceolate sheathing leaves. Leaves distant ⅙ inch long. Flowers 1-2 erect ¼ inch long. Bracts short long lanceolate obtuse. Perianth tube nearly cylindric ¼ inch long with 3 rather or very narrow wings. Sepals ovate subacute, thick pustular. Petals very minute or apparently absent. Style stout arms short curved. Stigmas thick rounded.

Gonyanthes Wallichii Miers, Trans. Linn. Soc. XVIII. 537

B. Griffithii, Becc. Malesia I. 254. *B. lutescens* Becc. l.c.

Singapore: Kranji (Ridley); Pahang: Tahan Woods (Ridley); Selangor: 15th mile Pahang Track (Ridley); Kedah: Gunong Jerai (Ridley). Distrib. Nepal, Mergui, Borneo, Hongkong.

A very delicate little plant occurring sporadically in dense forest. If I am correct in considering all these plants as the same species there is a considerable variety in the development of the wings of the perianth which are somewhat large in some forms, (*B. lutescens*) in others almost suppressed. Miers l.c. describes the flowers as "purpurei." I have always found them white.

6. B. OBLONGA, Ridl. Journ. Roy. As Soc. S. Br. Vol. 41, p. 33. A slender saprophyte 5 inches tall with numerous wiry roots. Stem sparingly or not at all branched. Leaves sheath-like scales, few and distant. Flowers white one or two on the end of the stem $\frac{3}{8}$ inch long and $\frac{1}{4}$ inch wide across the wings, tube narrow, wings oblong with straight edges, angles rounded. Sepals and petals short blunt. Petals much shorter than sepals.

Penang on rocks at 1500 to 2000 feet alt. (King's Collector 2270); Selangor: Semangkok Pass (Napier; Ridley 12108). Endemic.

This resembles *B. coelestis* in the form of the flower but is a saprophyte. The very broad oblong wings are very distinctive.

7. B. TUBEROSA, Becc. Males. 1, 245, t. 14, fig. 1-4. Small white saprophyte 3-6 inches tall, rhizome tuberous. Leaves lanceolate scale-like scattered on the stem. Flowers 5 or 6 crowded on the apex of the stem $\frac{1}{4}$ inch long shortly pedicelled. Bracts lanceolate acute white. Perianth tube not winged. Sepals ovate obtuse yellow. Petals very small not half as large. Stamens in the throat of the tube, connective oblong with a tooth above and below. Style as long as the tube arms short, stigmas reniform. Fruit $\frac{1}{4}$ inch long elliptic. Seeds oval nodulose.

Singapore, Changi, Bukit Timah, etc., (Ridley); Malacca: Sungei Hudang (Hervey). Mount Ophir (Ridley); Selangor: Petaling (Ridley); Kedah: Gunong Jerai (Ridley). Distrib. Borneo.

Occurs in damp woods buried for half its length or more in rotten leaves. Flowers scented like cowslips.

8. B. CHAMPIONII, Thwaites Enum. 325. Small saprophyte, about 2-6 inches long, rhizome stout over 2 inches long covered with ovate white scales, roots long and wiry. Stem stout with numerous lanceolate acuminate leaves $\frac{1}{8}$ to $\frac{1}{4}$ inch long. Flowers 4-5 crowded in a head, half an inch long white. Bracts oblong obtuse $\frac{1}{4}$ inch long. Perianth tube sub-cylindric not winged. Sepals ovate subacute $\frac{1}{8}$ inch long. Petals very small short blunt terete processes. Style arms very short, stigmas reniform. Capsule globose.

Hook. fil. Fl. Brit. Ind. V. 666. Trimen. Flora of Ceylon Vol. IV p. 131, Pl. 87.

Selangor: Damp woods on the Labu river (Ridley). Distrib. Ceylon.

This plant grows deeply sunk among decaying leaves. It is closely allied to *B. tuberosa* Becc. but is distinguished by its stouter habit, the rhizome covered with scaly leaves, larger bracts and flowers.

2. Gymnosiphon, Bl.

Saprophytes, with slender branched or simple stems small scale like leaves and small flowers in a short raceme, or cyme. Perianth tube cylindric not winged. Sepals broad. Petals smaller or absent. Anthers 3 oblong sessile near the mouth of the perianth tube, connective broad with no appendages. Style shortly trifid. Ovary unilocular. Capsule oblong or globose, crowned with the persistent lower half of the tube. Seeds subglobose fusiform rugose.

Species 12 chiefly South American, 1 African, 2 or 3 Malayan. *G. aphyllum* Bl. Enum. Pl. Java p. 29.

Stem wiry whitish, branched 4-5 inches tall. Leaves few ovate lanceolate or ovate, blunt $\frac{1}{8}$ inch long. Flowers few thin pale violet $\frac{1}{16}$ inch long on slender pedicels $\frac{1}{8}$ inch long. Perianth tube very short. Sepals ovate acute. Petals minute linear lanceolate. Capsule cylindric, reticulate below, and the enlarged perianth tube above. Seeds elliptic ovoid inaequilateral, dark brown ribbed. Mip. Fl. Nederl. Ind. Vol. 3, p. 615.

G. borneense, Becc. Males. I. 241, t. 14, fig. 5-9.

Singapore: Bukit Timah, etc. (Ridley); Johor: Batu Pahat (Kelsall); Malacca: Sadanen (Ridley); Pahang: Taka Tahan (Ridley); Selangor: Petaling; Kedah: Gunong Jerai (Ridley). Distrib. Sumatra, Java, Borneo and Papua.

In damp woods common but sporadic.

3. Thismia, Griff.

Fleshy saprophytes, with a creeping rhizome and ascending stem a few inches tall with scale-like leaves, and 1 or 2 terminal flowers rather large for the plant. Perianth tube campanulate or turbinate falling off completely as the fruit ripens. Sepals and petals usually elongate lanceolate acuminate or caudate, similar or differing in size and form. Petals similar. Stamens 6 adnate to the tube, filaments very short, connectives broad and often connate by the edges, deflexed. Style short and thick, stigmas very small. Ovary turbinate 1 locular. Capsule fleshy, opening by a deciduous lid. Seeds very numerous oblong ribbed.

Species 12-15. Tropical Asia and South America.

Sepals and petals flat lanceolate acuminate	1. *Th. fumida.*
Sepals short flat, petals caudate	2. *Th. arachnites.*
Sepals and petals caudate terete.	
Perianth tube erect large urn-shaped ...	3. *Th. grandiflora.*
Perianth tube erect obconic	4. *Th. aseroe.*
Perianth tube bent at an angle with ovary	5. *Th. chrysops.*

1. TH. FUMIDA, Ridley Journ. Roy. As. Soc. Straits Branch Vol. 22, p. 338. Plant 4 inches tall, rhizome with 3 or 4 stems. Leaves scale-like very small lanceolate acuminate. Flower solitary $\frac{5}{8}$ inch long, nearly $\frac{1}{2}$ inch across. Perianth tube nearly globose scabrid, narrowed above the ovary white with pink stripes. Sepals and petals equal narrow lanceolate acuminate, with subulate tips greenish grey. Style very short with small recurved arms. Capsule short, broad scabrid ribbed edge crenulate.

Singapore: Chan Chu Kang (Ridley); Selangor: Petaling (Ridley). Among dead leaves rare. Endemic.

2. TH. ARACHNITES, Ridl. Journ. Roy. As. Soc. S. Br. Vol. 44, p. 197. Stem 1-3 inches long creeping. Flowers 2-3. Bracts lanceolate acute $\frac{1}{4}$ inch long peduncle nearly half an inch long. Perianth tube urn-shaped, narrowed at the base $\frac{3}{4}$ inch long $\frac{3}{8}$ inch wide, semi-transparent with numerous vertical ribs and transverse bars, whitish, with 6 red vertical streaks, ring distinct yellow, sepals rounded ear-like short. Petals caudate white slender $1\frac{1}{2}$ inch long. Stamens deflexed close to the mouth oblong $\frac{1}{4}$ inch long, an oval perforation close to the base and numerous teeth at the tip, anthers very small. Style short thick trilobed. Capsule cup-shaped $\frac{1}{4}$ inch long and wide edges thickened.

Perak, Larut Hills, dense forest just above the Tea Gardens, February (Ridley).

3. TH. GRANDIFLORA, Ridl. l.c. 324. Plant $1\frac{1}{2}$ inch tall 1 flowered. Leaves and bracts scale-like lanceolate acuminate with glandular hairs. Flower large, perianth tube 1 inch long urn-shaped pink with darker stripes. Petals and sepals triangular with terete processes rising from the backs, pink, an elevated ring round the mouth of the tube, low, brown. Anthers connate connective quadrate with 3 cylindric processes, the central one longest. Style longer than in most species, arms oblong lanceolate obtuse papillose.

Johor: Bukit Tana Abang, Sembrong river (Kelsall). Endemic.

4. TH. ASEROE, Becc. Malesia I. p. 252, Pl. 10. Plant 2-3 inches long, rhizome creeping, stems erect branched or simple with a few scattered bract-like leaves. Flowers usually solitary on the end of each branch, $\frac{1}{2}$ an inch long. Bract 2 lanceolate acute. Perianth

tube obconic yellow, elevated ring prominent. Sepals and petals similar tringular terminated by cylindric tails much longer bright orange. Anthers connate by the edges, connectives 3 toothed. Style moderately long thick scabrid. Stigmas very small. Capsule brown ribbed. Seeds elliptic oblong ribbed. Ridley l.c. 336, Groom. Annals of Botany Vol. IX. 327, Pl. 13, 14.

Singapore: Woodlands (Beccari). Bukit Timah, Kranji, etc., (Ridley); Pahang: Kota Glanggi (Ridley); Selangor: Petaling. The commonest and most conspicuous species, often dotting the woods with its small bright yellow starry blossoms. Endemic.

5. Th. CHRYSOPS, Ridley Ann. Bot. IX. p. 323, t. XII. Plant 3 inches tall. Leaves few lanceolate acute scale-like. Flowers one or two on short dark brown. Perianth tube oblong deflexed above the ovary, dilated ¼ inch long deep chocolate brown, ovary pink, raised ring round tube mouth yellow. Sepals and petals filiform from a wider base, deep brown ciliate. Anthers oblong connate, apices truncate with short processes the two outer ones longer clubbed. Style short and thick, arms linear bifid. Capsule turbinate rugose. Seeds fusiform rugose.

Malacca: Mount Ophir on rotten logs (Ridley). Endemic.

4. BAGNISIA, Becc.

Fleshy saprophyte resembling *Thismia* but the sepals are spathulate and connate at the apices forming a dome over the mouth of the tube. Petals suppressed. Stamens connate by the broad connectives, which are perforate, or entire. Style short, stigma discoid 6 lobed. Fruit as in *Thismia*.

Species 3 or 4. Borneo and Malay Peninsula including *Geomitra* which seems hardly generically distinct.

B. CROCEA, Becc. Malesia 1 249. T. XII. var, *brunnea*. Very small saprophyte about an inch long with a stout rhizome, entirely red brown. Stem very short, with rather long lanceolate scale like leaves. Bracts ovate. Flower solitary larger than the stem, perianth tube enlarged upwards thick almost pear-shaped. Sepals linear connate over the top of the tube.

Perak. In dense woods on the Larut Hills below Gunong Hijau, very rare. I only obtained a single specimen of this plant, and was unable to preserve it properly. It is probably a variety of *B. crocea* but is much smaller and of a different colour, and the tube of the perianth is more swollen upwards. It should be looked for again.

VII. TACCACEAE.

Terrestrial herbs, with a very short stem or tuberous rhizome, and entire or pinnatifid leaves. Scape usually tall, leafless. Flowers

umbelled green or purple. Bracts involucral 2-6 large. Floral bracts long filiform. Perianth superior urceolate or campanulate, 6 lobed. Lobes subequal, lanceolate or ovate. Stamens 6 adnate to the tube, filaments very short, connective broad hooded. Anthers sessile concealed small. Ovary 1-celled. Style short included. Stigmas 3 broad or petaloid reflexed. Fruit baccate or 3-valved ribbed. Seeds numerous ovoid ribbed, albuminous, embryo minute.

TACCA, Forst.

Character of the order. Fruit indehiscent.

Species about 10. Tropical Asia, Africa, Australasia.

Leaves pinnatifid	1. *T. pinnatifida.*
Leaves palmate	2. *T. palmata.*
Leaves entire lanceolate.	
Involucral bracts two inner ovate clawed purple	3. *T. cristata.*
Involucral bracts two inner ovate sessile purple	4. *T. vespertilio.*
Involucral bracts small lanceolate green ...	5. *T. minor.*

1. T. PINNATIFIDA, Forst. Plant Esculent. No. 28, Char. Gen. t. 35. Rhizome large globose. Leaf 1-3 feet tall, petiole light green deeply channelled, blade 2-3 feet across tripartite or pinnatifid. Scape 2-3 feet tall channelled. Flowers usually numerous nodding green. Involucral leaves about 8 lanceolate acute 2 inches long, ½ inch wide. Floral bracts very numerous filiform 6 inches long. Pedicels 1½ inch long. Perianth tube short and broad lobes subequal lanceolate fleshy edges thinner green subacute ¼ inch long. Stamens, filaments short broad, anthers oblong truncate, adnate to lobes, above the tube. Style very short, stigmas peltate. Fruit ovoid ribbed as big as a pigeon's egg.

Roxb. Fl. Ind. II. 172, Benth. Fl. Austral. VI. 458. Miquel Fl. Ind. Bat. III. 566. Kunth. Enum. V. 458. Lodd. Bot. Cab. t. 692. Regel Gartenflora t. 582. Lamarck Encycl. t. 232. Griff. Notul. 238, Ic. Pl. As. t. 272A. Hook. fil. Fl. Brit. Ind. VI. 287.

T. pinnatifolia, Gaertn. Fruct. I. 43, t. 13.

Penang: near Pekan; Cherating River (Ridley); Sungei Ujong: (Herb. H. B. Singapore); Malacca: Pulau Besar (Maingay 3267). Distribution, India, Malay Islands, Australia, Pacific.

Occurs in sandy places near the sea. Native name "Lukeh." Tubers eaten.

2. T. PALMATA, Bl. Enum. 1. 83. Tuber small. Leaves palmate with 4 to 7 lobes broad or narrow 6 inches long, 1-3 inches wide

oblong lanceolate to lanceolate acute petiole a foot long. Scape a foot or more tall. Involucral bracts 4, two outer ones ovate acuminate 1 inch long, $\frac{3}{4}$ inch wide, 2 inner ones ovate petiolate acute $1\frac{1}{2}$ inch long, petiole as long as the blade. Floral bracts none. Flowers 10 or more small green, pedicels $\frac{1}{4}$ inch long. Perianth tube campanulate $\frac{1}{6}$ inch long lobes subequal orbicular obtuse narrowed at the base inner ones spathulate. Stamens, filaments short, anther elliptic. Style thick arms recurved thick. Fruit globose $\frac{1}{4}$ inch long on longer pedicels.

Schaur. Nov. Act. Bonn. 1843, Supp. 444. Kunth. Enum. V. 461. Miq. Fl. Ind. Bat. 3577.

Johore, Pulau Aor (Feilding). Not yet found on the mainland. Distrib. Saint Barbe Island, Borneo, Java.

3. T. CRISTATA, Jack. Mal. Misc. I. No. V. 23. Rootstock thick 4 inches long. Leaves lanceolate acuminate long petioled, $1\frac{1}{2}$ to 2 feet long 4 to 7 inches wide, petiole a foot or more. Scapes erect 1 to 3 feet tall. Involucral bracts 2 pairs, outer ones lanceolate or oblong 6 inches long by 4 inches wide purple, inner pair larger erect ovate tapering into a claw below, base purple, upper part white or all purple. Floral bracts long filiform numerous 6 inches long purple tipped white. Flowers 5 to 18, pedicels $\frac{1}{2}$ inch long, perianth tube short and broad. Sepals oblong $\frac{1}{2}$ inch long $\frac{1}{4}$ inch wide. Petals orbicular oblong, broader, all purple. Stamens filaments very short, conective broad incurved conic. Style very short. Stigma 3 lobed lobes purplish blunt rounded. Berry black $3\frac{1}{2}$ inch long $1\frac{1}{4}$ inch through, nodding on an elongate thickened pedicel, oblong obcuneate 6 keeled, terminated by the persistent perianth tube. Seeds numerous elliptic ribbed brown. Miquel. Fl. Ind. Bat. III. 578, Hook. fil. Fl. Brit. Ind. VI. 287.

T. Rafflesiana, Jack. Wall. Cat. 5172. *Atacca cristata*, Kunth. Enum. V. 476, Bot. Mag. t. 4587. Lemaire Jard. Fleur. t. 186, 187. Flore des Serres. t. 860 861.

Singapore: (Wallich 5172), Bukit Timah etc. (Ridley); Johore: Batu Pahat; Malacca: Jus, Selandor; Selangor: Kwala Lumpur; Perak: Larut Hills (King's Coll. 2809), Kwala Kangsa; Penang: West Hill (Curtis 336). Distrib. Moulmein.

Common in forests all over the peninsula to 2000 feet alt. Natives names "Sebiak," "Jangut Bawo."

4. T. VESPERTILIO, Ridl. Stem short as in *T. cristata*. Leaves elliptic lanceolate long petioled, petiole 6-8 inches long, smooth, blade 12 inches or less, 6 inches across, base rounded, tip acuminate, margin wavy bright green. Scape over a foot long smooth. Involucral bracts 2 outer short lanceolate acuminate $1\frac{1}{2}$ inch long $\frac{1}{2}$ inch wide green tipped purple, 2 inner ones ovate sessile alternate with the others brown purple 2 inches long $1\frac{1}{2}$ inch wide, glabrous. Flowers 3-5.

Filiform bracts 7 inches long base purple tips white. Pedicels stout 1 inch, perianth tube campanulate purple $\frac{1}{2}$ inch. Sepals lanceolate, acute purplish $\frac{1}{4}$ inch petals broader oblong ovate obtuse. Stamens shortly pedicelled, anther conic. Stigma peltate 3 lobes retuse.

Perak, Kamuning (Machado). Fl. H. B. Singapore.

5. T. MINOR, n.sp. Rootstock erect cylindric $1\frac{1}{2}$ inch tall. Leaves elliptic acuminate or lanceolate slightly narrowed at the base 6 to 10 inches long 2 to 4 inches wide, bright green petiole shorter smooth. Scapes 3-6 inches long. Involucral bracts olive green, outer ones lanceolate acuminate, inner ovate acuminate as long but wider, $\frac{3}{4}$ to 1 inch long. Filiform bracts 5 inches long dusky with pale tips. Flowers few, in thick pedicels $\frac{3}{4}$ inch long. Perianth $\frac{1}{2}$ inch across. Sepals erect about half as wide as the petals, lanceolate triangular acuminate brownish green. Petals oblong triangular acuminate. Stamens purple, fruit $1\frac{1}{2}$ inch long, three keeled. Seeds crescent-shaped $\frac{1}{8}$ inch long with 8 stout ridges.

Perak, Banks at Lady Weld's Bungalow, Kwala Kangsa, and at Tambun near Ipoh (Ridley) (Scortechini); Kelantan: Kwala Lebir (Dr. Gimlette). Endemic.

T. viridis, Hemsl. Ic. Pl. 2515, 2516. "Probably from the Malay Peninsula" was collected at Trang in S. E. Siam by Mr. Goldham.

VIII. DIOSCOREACEAE.

Rootstock often tuberous. Stem climbing branched or rarely short erect. Leaves entire, lobed, or trifoliolate ribbed and reticulate. Flowers small or minute panicled, racemose or spicate green white or purple, unisexual or rarely bisexual. Perianth superior 6 lobed, tube short urceolate or tubular. Stamens in male on the base of the perianth or on its lobes, 3-6, or 3 with three staminodes, filaments short. Anthers globose or oblong. Pistillode often absent. Staminodes in female flower 3, 6 or 0. Ovary triquetrous 3 celled. Styles 3 very short with entire or bifid recurved stigmas, ovules 2 in each cell pendulous, anatropous or amphitropous. Fruit baccate or a three valved capsule. Seeds flat or globose embryo small enclosed in hard albumen.

Stem erect. Flowers moderately large bisexual	1. *Trichopus.*
Climbers. Flowers very small unisexual. Fruit capsular	2. *Dioscorea.*
Climbers. Flowers bisexual	3. *Stenomeris.*

1. TRICHOPUS, Gaertn.

A small herb with a tuft of wiry simple stems 3 to 4 inches tall. Leaf subterminal cordate petiolate reticulate. Flowers 1-several on

long pedicels bisexual. Ovary 3 winged. Perianth tube very short. Sepals and petals subequal spreading. Stamens 6, filaments very short. Anthers broad with divaricate loculi, connective prolonged into a long cylindric process. Style short and thick. Stigmas 3 bilobed thick rounded pear-shaped. Fruit indehiscent three winged. Seeds wrinkled. Species 1, India, Ceylon and Malay Peninsula.

TR. ZEYLANICUS, Gaertn. Fruct. Vol. I. p. 44, t. 14. Rhizome very short. Stems 3-4 inches tall terminated by a tuft of small bracts, and a single lanceolate or cordate ovate leaf 3-4 inches long 1-2½ inch wide. Petiole 2-3 inches long. Flowers 1-4 from the tuft of bracts on pedicels 1-2 inches long. Perianth tube very short campanulate lobes ovate lanceolate spreading purple. Fruit triangular triquetrous on an elongate pendulous pedicel, 2 inches long; green with pink spots, ¾ inch long, ⅝ inch wide.

Beccari, Nuov. Giorn. Bot. Ital. II. p. 13, t. 3. Beddome Ic. Pl. Ind. or. p. 68, t. 290. Hook. fil. Fl. Brit. Ind. Vol. VI. p. 13, t. 3, Trimen. Flora of Ceylon VI. p. 279. Hook. fil. Bot. Mag. t. 7530. *Trichopodium cordatum, intermedium* and *angustifolium.* Lindl. Bot. Reg. sub. t. 1543. *T. zeylanicum* Thw. Enum. Pl. Zeyl. p. 391, 443. *Podianthus arifolius* Schnitzl. Bot. Zeit. Vol. I. 1843, p. 739.

Pahang, Tahan Woods (Ridley). Distrib. Travancore and Ceylon.

2. DIOSCOREA, L.

Climbers with tuberous rhizome. Stems branched spiny or terete or winged. Leaves opposite or alternate entire or digitately 3-5 foliate with 3-9 veins. Flowers very small in spikes or racemes pendulous, unisexual, male flower. Perianth lobes short rotate. Stamens 6 or 3 imperfect or absent, inserted at the base of the segments. Pistillode various. Female flower. Perianth as in male. Staminodes 3 or 6. Style short or absent. Stigmas 3 linear entire or bifid. Ovary 3 angled, 3 celled. Ovules 2 in each cell. Capsule 3 winged loculicidal. Seeds flat winged.

Species 150. All warm parts of the world.

Leaves 3 to 5 foliolate. Capsule oblong.

Stamens 6 ... ... 1. *D. daemona.*

Stamens perfect 3 ... ... 2. *D. pentaphylla.*

Leaves simple. Capsule broader than long.

Sepals broadly oblong or orbicular.

Leaves pubescent beneath.

Base cordate.

Upper surface glabrous ... ... 3. *D. cornifolia.*

Upper surface hairy ... ... 4. *D. polyclades.*

Leaves simply pubescent. Sepals orbicular 5. *D. pyrifolia.*

Leaves with stellate hairs. Sepals ovate ... 6. *D. orbiculata.*
Leaves quite glabrous, not deeply cordate.
Leaves thin textured.
Buds gibbous at base. Petals ovate ... 7. *D. gibbiflora.*
Buds not gibbous. Petals oblong ... 8. *D. zollingeriana.*
Buds not gibbous. Petals oblong spathulate 9. *D. glabra.*
Leaves sub-coriaceous linear or elliptic ... 10. *D. laurifolia.*
Leaves very coriaceous ovate oblong ... ... 11. *D. deflexa.*
Leaves deeply cordate.
Stem terete sepals linear ... ... 12. *D. sativa.*
Stem 4 angled, sepals oblong or lanceolate 13. *D. alata.*

1. D. DAEMONA, Roxb. Fl. Ind. III. 805. Root a large tuber. Stem terete spiny glaucous. Leaves trifoliolate, petiole 3 to 6 inches long, leaflets ovate cuspidate, narrowed at the base and petiolulate, lateral leaflets inaequilateral 5-6 nerved reticulate, 3 to 7 inches long 2 to 4 inches wide, nerves hairy. Male panicles long lax 6-12 inches long, branches distant tomentose, flowers very small crowded. Bracts short ovate tomentose. Perianth lobes 3 ovate tomentose. Stamens 6 filaments short and thick. Female spikes solitary. Capsule oblong with 3 stout ridges or wings, 2 inches long $\frac{3}{4}$ inch across tomentose. Seeds one inch long oblong. Wight Ic. t. 811. Hook. fil. Fl. Brit. Ind. VI. 289. *D. virosa*, Wall. Cat. 5099. Kunth. Enum. V. 413. *D. hirsuta* Dennst. Schluess. Hort. Mal. 33. Bl. Enum. I. p. 21. Miq. Fl. Ind. Bat. III. 373. *Helmia daemona* Kunth. l.c. 437.

Singapore: Changi (Ridley); Malacca: Sungei Hudang and Malaka Pindah (Goodenough); Selangor: Kwala Lumpur (Ridley 4596); Perak: Larut (4190); Penang: Muka Head (Curtis 2415). Distrib. India. Burmah, Siam, Malay Islands.

Common round villages more or less cultivated. The tubers after slicing and washing in running water are eaten, and an extract from them is sometimes used in making dart poison. Native name "Gadung."

2. D. PENTAPHYLLA, L. Sp. Pl. 1032. Roots tuberous. Stems long twining bulbiferous. Leaves 3 to 5 foliolate. Petiole $1\frac{1}{2}$ to 2 inches long brown-tomentose, leaflets unequal elliptic cuspidate glabrous above, red tomentose beneath on the nerves, 2 inches long 2 inch wide, petiolules $\frac{1}{4}$ inch long. Male panicles 2 feet long with long tomentose branches. Flowers sessile very crowded white and fragrant. Bracts lanceolate as long as the flowers. Sepals lanceolate acute pubescent. Petals shorter and blunter. Stamens 3. Staminodes 3 very short. Pistillode conic rather large. Female spikes solitary or panicled 6 to 8 inches long flowers scattered $\frac{1}{8}$ inch long, ovary pubescent. Sepals ovate edges hairy. Capsule rounded at both ends or base cordate and tip apiculate $\frac{3}{4}$ to 1 inch long.

Roxb. Fl. Ind. III. 806. Wight Ic. t. 814. Kunth. Enum. 396. Trimen. Fl. Ceyl. VI. 276. Bl. Enum. I. p. 30, (part). Miq. Fl. Ind. Bat. III. 574, Hook. fil. Fl. Brit. Ind. VI. 289. *D. triphylla*, Linn. l.c. Jacq. Ic. t. 627. *D. Kleiniana* Kth. l.c. 394. *D. lunata*, Roth. Not. Pl. Sp. 370. *D. digitata* Mill. Gard. Dict. No. 6. *Botryosicyos pentaphyllus*, Hochst. Flora 1844, Beil. 3, *Hamatris triphylla* Salisb. Gen. Pl. Fragm. 12.

Johor: Gunong Panti (Ridley 4139); Malacca: Merlimau (Goodenough 1570); Pahang: Tahan Valley (Ridley 2355), Kemaman (Vaughan Stevens), Lankawi (Curtis 2539). A variety with smaller more glabrous leaves, smaller male spikes and pedicelled flowers). Distrib. India, Malay Islands, and Tropical Africa.

Tubers sought for food by the Sakais "Ubi pasir," "Ubi Chiabet."

3. D. CORNIFOLIA, Kunth. Enum. V. 385. Stem pubescent, base thorny. Leaves opposite coriaceous ovate or lanceolate-ovate cuspidate 5 nerved, base cordate 3 inches long 1½ inch broad glabrous above pubescent beneath, especially on the nerves. Petiole stout pubescent, an inch long. Male spikes whorled 1-2 inches long pubescent. Bracts small ovate or ovate acuminate. Sepals ovate. Petals oblong spathulate stamens 3. Filaments very short. Female flowers scattered. Capsule broad rounded, wings unequal glabrous ¾ inch long, 1¾ inch wide across the two broadest wings the third wing smaller.

Singapore: Garden Road (Ridley 4127), Bukit Mandai Road (3768); Malacca (Maingay 1705, 3391); Selangor: (Cantley's Coll.); Johor: Teling Tinggi (Ridley 1190); Dindings, Simpit (Ridley); Selangor: Rawang (Ridley 10489).

Native name "Akar Kemeniyan hantu." Common in hedges.

I only know Kunth's plant from the description. It is based on Zollinger's Javanese plant No. 875.

The under side of the leaves is very finely dotted and sprinkled all over with short thick scattered hairs.

4. D. POLYCLADES, Hook. fil. Fl. Brit. Ind. VI. p. 294. Stems fairly stout pubescent. Leaves ovate cordate cuspidate covered with stiff hairs scattered above, thicker beneath, 3 to 4 inches long, 2 to 3 inches wide. Petiole 2 to 3 inches long tomentose. Male panicles 1 to 2 feet long. Branches in pairs opposite 2 to 3 inches long. Spikes 6 to 10 in a whorl ½ an inch long tomentose. Flowers ½ inch long green tomentose. Sepals ovate. Petals elliptic. Stamens 6 very small. Capsule broadly oblong transversely, hairy ¾ inch long 1½ inch wide.

Singapore: Chan Chu Kang, Sungei Pandan (Ridley 1646); Perak: Kinta (King's Coll. 7161).

5. D. PYRIFOLIA, Kunth. Enum. V. 384. Stem slender terete. Leaves ovate entire cuspidate, rarely lanceolate or elliptic 3 to 6 inches long, 2 to 5 inches wide, prominent nerves 5-7, above glabrous, beneath pubescent, petiole 1-2 inches long pubescent. Male panicles a foot or more long, spikes 4 to 10 in a whorl 1-2 inches long. Flowers green sessile scattered. Sepals orbicular, petals cuneate obovate smaller. Stamens 3 very small. Pistillode minute. Female spikes 4 inches long. Capsule orbicular 3 winged 1 inch long $1\frac{1}{2}$ inch across. Seed orbicular $\frac{3}{4}$ inch across. Hook fil. Fl. Brit. Ind. VI. 292.

Singapore: (Wallich), Chan Chu Kang; Changi (Ridley 3943, 4595); Johor: Kota Tinggi (Ridley), Ulu Kahang (Kelsall 4008); Malacca: (Cuming 2314) (Griffith 5562); Sungei Ujong: (H. B. Singapore); Perak: Thaiping (King's Coll. 8376), Goping (King's Coll. 800). Distrib. Tenasserim; Islands South of Singapore.

Common in woods and thickets. Native name "Akar Guluno."

6. D. ORBICULATA, Hook. fil. Fl. Brit. Ind. VI. 292. Stem fairly stout. Leaves thin, glabrous above, beneath reticulate with stellate hairs especially at the base, 2-3 inches long, $1\frac{1}{2}$-2 inches wide, petiole 2 inches long pubescent. Male panicles about a foot long, pubescent. Spikes in whorls of 4 or 5 distant 3 inches long. Flowers yellow sessile scattered, rachis pubescent. Bracts ovate acuminate. Sepals ovate. Petals oblong elliptic. Filaments very short.

Malacca: (Cuming 2314); Sungei Hudang (Goodenough 1642); Perak: Larut (King's Collector 5068), Goping (514), Tapa (Wray 1255); Penang: Government Hill (Curtis 910) Philipps, Porter in (Wall. Cat. 5108 C. *D. sativa).* Endemic.

Native name "Akar Kakop."

7. D. GIBBIFLORA, Hook. fil. Fl. Brit. Ind. VI. 294. Stems very slender. Leaves opposite thin oblong lanceolate glabrous base entire or cordate 2 to 3 inches long $1\frac{1}{2}$ inch broad, petiole slender one inch long. Panicle about a foot long, spikes very slender $1\frac{1}{2}$-2 inches long or more. Flowers very small, base of buds gibbous. Sepals ovate, petals as large ovate. Stamens very short pistillode obscure. Penang (Wallich 5105 B. in part). Endemic, not collected since.

8. D. ZOLLINGERIANA, Kunth. Enum. V. 384. Stems slender. Leaves mostly opposite thin glabrous elliptic cuspidate base rounded, 5 nerved 2-3 inches long one inch wide, petiole slender an inch long. Male panicle long and slender a foot or more. Spikes slender 1 to 3 inches long 3 or more in a whorl, rachis angled minutely pubescent. Flowers very small distant pubescent. Bracts shorter ovate. Sepals oblong ovate. Petals nearly as long oblong obtuse. Stamens 6 filaments fairly long. *D. tenuifolia,* Ridl. Journ. Roy. As. Soc. S. Br. Vol. 41, 34.

Singapore, Bukit Timah (Ridley 4596). Distrib. Java.

9. D. GLABRA, Roxb. Fl. Ind. III. 804. Stem fairly stout. Leaves rather thin textured elliptic ovate lanceolate, lanceolate or almost orbicular, acuminate, base rounded broad or cordate, nerves 5-7 glabrous, glaucous beneath 2-4 inches long 1½-2 inches wide petiole 1 inch long. Male panicles slender a foot long or more. Spikes slender whorled less than an inch long. Flowers sessile. Bracts ovate acute. Sepals ovate. Petals oblong obcuneate, spathulate. Female spikes about a foot long, flowers remote. Capsule large rounded retuse, wings nearly equal, one inch long 1½ to 2 inches wide.

Kunth. Enum. V. 383, Hook. fil. Fl. Brit. Ind. VI. 294.

Singapore: Garden Jungle (Ridley 8059); Sungei Ujong: Bukit Sulu; Burunang (Herb. Bot. Gard. Singap.); Malacca: Ayer Kuning (Cantley); Perak: Larut (King's Coll. 2370); Penang: Government Hill (Curtis 62, 63, 1088); Province Wellesley: Tasek Gelugur (Ridley 6986); Lankawi, Kwah (Curtis 2121, 2612, 2164). Distrib. India.

Native names "Akar Jangut Kulonak," "Akar Munujan," "Akar Mawas."

10. D. LAURIFOLIA, Wall. Cat. 5111, Hook. fil. Fl. Brit. Ind. VI. 293. Stem slender. Leaves lanceolate to oblong or elliptic obtusely acuminate thinly coriaceous 3 nerved strongly reticulate beneath, 2-3½ inches long 1½ inch wide, petiole 1 inch. Male panicles slender 1-2 feet long, racemes deflexed in alternate pairs, 1 to 3 inches long. Flowers numerous scattered minute green. Bracts lanceolate acuminate. Sepals ovate obtuse. Petals linear oblong. Anthers lanceolate subsessile. Pistillode small. Female panicles about a foot long with few branches. Flowers few distant. Capsule glaucous 3 winged transversely elliptic retuse 2 inches long by ¾ inch wide. Seeds thin orbicular.

Singapore: Tanglin; Johor: (Ridley 9175), Batu Pahat (Ridley); Selangor: Kwala Lumpur (Ridley 10219); Malacca: Merlimau, Mount Ophir (Ridley); Perak: Hermitage Hill (Ridley), Gunong Keledang (Ridley 9569), Larut (King's Collector 5449); Penang: (Porter Wall. Cat. 5111), Government Hill (Curtis 2292).

Native name, "Akar Surinting;" "Akar Kamahang." Ascends to about 4000 feet alt.

11. D. DEFLEXA, Hook. fil Fl. Brit. Ind. VI. 293. Stem rather stout. Leaves opposite or alternate strongly coriaceous, edge not thickened, ovate oblong acuminate 5-nerved base rounded or obscurely cordate, 4-5 inches long 1½-3 inches wide glabrous. Male panicles long 1 foot or more, spikes 8 or more in distant whorls or tufts abruptly deflexed 1 inch long. Flowers globose sessile, crowded. Bracts much shorter lanceolate acuminate. Sepals broadly ovate, petals oblong. Anthers and pistillode large. Female inflorescence much

branched lax-flowered perfectly glabrous. Capsule 2 inches broad retuse at top and base. Seed nearly an inch wide, wing very broad.

Singapore: (Maingay); Malacca: (Maingay); Perak: Larut Hills (King's Coll. 3972, 3858, 6568). Endemic.

12. D. SATIVA, Linn. Sp. Pl. 1033. Tubers large variable in form. Stem terete, with large warted tuberous bulbils. Leaves ovate cordate deltoid acuminate, thin light green glabrous 3 to 6 inches long $1\frac{1}{2}$-$3\frac{1}{2}$ inches wide. Male panicles very long leafless or nearly so, or spikes in pairs on a leafy branch. Spikes 1-$1\frac{1}{2}$ inch long slender, flowers large for the genus white. Bracts lanceolate acuminate. Sepals $\frac{1}{10}$ to $\frac{1}{4}$ inch long narrow linear lanceolate acute. Petals as long linear. Stamens 6 filaments nearly as long as the anthers. Femle spikes 4 to 10 inches long. Flowers $\frac{1}{4}$ inch long. Styles short thick. Stigmas broad bifid recurved. Capsule oblong an inch long, wings fairly large.

Linn. Hort. Cliff. t. 28, Benth. Fl. Hongk. 268. Fl. Austral. VI. 460, Hook. fil. Fl. Brit. Ind. VI. 295. *D. bulbifera*, Br. Prodr. 294, Wight. Ic. t. 878. *D. Cliffortiana*, Lam. Encycl. III. 232, (not Ill. t. 818). *D. pulchella*, and *heterophylla* Roxb. Fl. Ind. III. 801-804. *Helmia bulbifera*, Kth. Enum. V. 435.

Singapore: Tanglin, Changi, etc., (Ridley); Selangor: Kwala Lumpur (Ridley). Distrib. East Indies.

Common in waste ground. Native names "Akar Kumili hutan," "Ubi Kistala." The natives do not consider the yams fit to eat.

13. D. ALATA, Linn. Sp. Pl. 1033. Tubers large white or purple within. Stems 4 angled and winged. Wings undulate or straight. Leaves deeply cordate orbicular or ovate, 5-7 nerved. Male flowers in slender fascicled spikes. Female spikes thicker. Capsule broadly obcordate coriaceous 1-$1\frac{1}{2}$ inch long. Seed broadly winged all round. Kunth. Enum. V. 387, Roxb. Fl. Ind. III. 797, Wight Ic. t. 810, Hook. fil. Fl. Ind. VI. 296. *D. atropurpurea*, Roxb. Fl. Ind. III. 800. Commonly cultivated, but very rarely flowering. Probably not native. Varieties, "Ubi Jawa" with short white-fleshed tubers, "Ubi Teropong" with long white yams; "Ubi Kenduduk" tubers small and red, and "Ubi Nasi" with large red tubers.

DOUBTFUL SPECIES.

D. sp. Tuberous. Stem woody angled and thickly covered with triangular flattened brown thorns 2 to 6 connate at the base forming short thorny ridges, the thorns $\frac{1}{4}$ inch long or more. Leaves deeply cordate acuminate 6 inches long and as wide, cusp $1\frac{1}{2}$ inch long, nerves 11 radiating from base and ascending to the cusp, transverse nervules prominent and numerous, petiole 4-5 inches long thorny along the upper edge.

Perak, Sungei Siput (A. D. Machado). No flowers or fruits of this have been seen and I am unwilling therefore to describe it as new. I can find however no description of any *Dioscorea* with these remarkable flattened thorns like those of a rose bush but much larger.

EXCLUDED SPECIES.

D. spinosa, Roxb. in Wall. Cat. 5703. "Malay Peninsula cultivated." Hook. fil. Fl. Brit. Ind. VI. 291. I have never seen this here nor are there any specimens from the peninsula in the Kew herbarium.

3. STENOMERIS, Planch.

Climbers, with ovate or ovate lanceolate cordate leaves many nerved and reticulate. Cymes axillary short. Flowers small pedicelled green or brown urceolate with narrow lobes. Stamens 6 filaments very short adnate to the mouth of the tube. Anthers oblong, deflexed. Style short conic clavate. Capsule elongate 3 winged, 3 valved septicidal. Seeds compressed winged above.

Species 3. Malay Islands.

S. borneensis, Oliv. Ic. Pl. 2328. Stem $\frac{1}{8}$ inch thick. Leaves ovate lanceolate, or ovate cordate acuminate, 5 to 7 inches long $1\frac{1}{2}$ to 3 inches wide with 5 to 10 prominent nerves. Cymes shortly peduncled few flowered. Bracts linear. Flowers $\frac{1}{4}$ inch long brown, tube dilated upwards fleshy, lobes linear narrow subequal. Stamens oblong small connective prolonged into a short point. Style columnar short grooved. Fruit 10 inches long $\frac{3}{4}$-1 inch wide. Seeds compressed winged above.

Selangor, climbing on bushes near the Caves, Kwala Lumpur, (Ridley) very rare. Distrib. Borneo.

I have only obtained a scrap of this plant, much damaged by caterpillars, but it seems identical with the Borneo plant. I do not find the processes of the stamens nearly as long as they are figured in the Icones.

IX. ROXBURGHIACEAE.

Herbs with climbing or erect stems. Leaves alternate or opposite petioled 3 or more nerved, with parallel cross nervules. Flowers axillary unisexual or bisexual. Perianth superior or half inferior. Sepals 2. Petals 2. Stamens 4 from the base of the perianth segments. Anthers dorsifixed. Ovary 1 celled. Stigma subsessile. Ovules 2 or more anatropous. Capsule 2 valved. Seeds oblong, testa coriaceous. Embryo long in the axis of hard albumen.

STEMONA, Lour.

Root of fleshy tubers. Stem climbing, rarely erect. Leaves opposite or alternate ovate thin petioled. Flowers on axillary peduncles. Perianth lobes 4 distinct. Stamens 4 linear acute coloured with a

broad connective. Anthers longitudinally dehiscing. Ovary small unilocular. Stigma sessile.

S. tuberosa, Lour. Fl. Cochin. 404 (not of others). Roots tuberous. Stem slender twining. Leaves alternate or opposite herbaceous ovate cordate acuminate 9-11 nerved, 4 to 5 inches long, 3 to 2 inches wide, petiole slender 2½ to 3 inches long. Flowers unisexual pendent 1 inch long, about 6 in axillary racemes with slender scabrid peduncles 2 inches long, pedicels ¼ inch. Bracts ovate lanceolate acute ⅛ inch long. Male flower. Sepals 2 lanceolate acute recurved connate at base. Petals erect similar, pink with green backs. Stamens as long acute, filament broad petaloid pink with a strong keel in front, connective prolonged acute. Anthers narrow divaricate linear. Capsule oblong beaked an inch long. Seeds strongly ribbed.

S. Curtisii, Hook. fil. Fl. Brit. Ind. VI. 298, Bot. Mag. t. 7254, Wright Journ. Linn. Soc. XXXII. 495.

Pahang: Pulau Changei, Pahang River (Ridley 2384); Perak: Lumut (Ridley 10305); Penang: Waterfall (Curtis 1522); Kedah: Yan (Ridley). Distrib. Siam, Cochin-China.

Loureiro's description such as it is applies better to the peninsular plant with red flowers, than to the green flowered Indian *S. gloriosoides* Voigt. Wright. l.c.c. erroneously refers the Pahang plant to this latter species. I have only seen one species in the peninsula. It is abundant on the banks of the Pahang River. He seems to have been misled by finding the leaves opposite in some specimens. They are often opposite and alternate on the same plant.

X. LILIACEAE.

Herbs, shrubs or trees, with fibrous or woody roots, or bulbs or corms. Leaves various. Flowers bisexual. Perianth inferior rarely sub-epigynous, petaloid. Sepals and petals 6, rarely 4 or 10. Stamens 6 rarely three, filaments free or connate, anthers oblong or linear. Ovary 3 celled, ovules 2 or more in a cell, anatropous, or rarely orthotropous from the inner angles of the cells. Style 1 rarely 3. Fruit baccate or drupaceous, or capsular. Seeds globose, angled or flattened. Embryo small in horny or fleshy albumen.

Species about 2500 in all regions of the world. Those occurring in the Malay region mostly belong to the more aberrant groups. Fruit capsular.

§ 1. PROTOLIRIACEAE. A small leafless saprophyte ... ... 1. *Protolirion.*

§ 2. OPHIOPOGONEAE. Seeds with a thick fleshy testa (blue) breaking through the ovary walls when quite small and remaining attached to the withered perianth.

Filaments connate in a fleshy ring ... 2. *Peliosanthes.*
Filaments free ... ... 3. *Ophiopogon.*

§ 3. ANTHERICEAE. Leaves narrow. Inflorescence panicled or racemose. Capsule three lobed, seeds flat ... ... 4. *Chlorophytum.*

Fruit baccate.

Herbs with habit of *Chlorophytum* but fruit a blue or white berry ... ... 5. *Dianella.*

§ 4. ASPIDISTREAE. Rhizome or erect stem short. Leaves herbaceous broad. Flowers racemose or spicate. Perianth campanulate. Stamens adnate to the tube. ... ... 6. *Tupistra.*

§ 5. ASPARAGEAE. Stems slender, erect or climbing. Leaves replaced by linear or acicular cladodes. Flowers small solitary racemed 7. *Asparagus.*

§ 6. DRACAENEAE. Shrubs or trees. Leaves subcoriaceous. Perianth cylindric or campanulate. Berry 1 to 3 seeded. ... ... 8. *Dracaena.*

§ 7. SMILACEAE. Climbing or rarely erect shrubs. Leaves 3-5 nerved, nervules reticulate, petiole usually cirrhiferous. Flowers in umbels unisexual small green or yellow.

Petals and sepals free to the base ... 9. *Smilax.*
Perianth lobes connate in a tube... ... 10. *Heterosmilax.*

§ 1. PROTOLIRIACEAE.

1. PROTOLIRION, Ridley and Groom.

Small slender saprophyte, with a slender rhizome. Stem erect. Leaves scale-like. Raceme corymbiform. Flowers small pedicellate. Bracts lanceate bifid. Sepals narrow. Petals broader. Stamens 6, 3 epigynous, 3 epipetalous. Anthers basifixed. Nectaries 3 opposite the petals. Pistil of three follicular carpels, syncarpous and adnate to the base of the perianth below, apocarpous above. Ovules anatropous, axillary in 2 rows. Capsules ovoid dehiscing above. Seeds 12 in each carpel elliptic oblong nodulose.

P. PARADOXUM, Ridley and Groom. Ann. Bot. Vol. IX. p. 45. pl. III. Rhizome 1-3 inches long. Stem flexuous 1-7 inches tall. Scale leaves crowded at the base and scattered above. Raceme 6 flowered. Flowers yellow on pedicels $\frac{1}{2}$ inch long. Bracts lanceate obtuse bifid. Sepals narrowly lanceolate acuminate. Petals larger ovate obtuse.

Stamens shorter than the petals filaments narrowed upwards. Anthers oblong. Carpels narrowed upwards into short styles. Stigmas capitate.

Perak: Gunong Keledang, Thaiping Hills, etc., (Ridley), Gunong Bubu (Wray); Kedah: Gunong Jerai (Ridley).

In dry woods at the base of Dacrydium at an altitude of 1 to 3000 feet.

§ 2. Ophiopogoneae.

2. Peliosanthes, Andr.

Herbs with a short creeping stem. Leaves petiolate lanceolate or plicate grassy. Scapes usually shorter. Flowers small green, white, or purple, racemose. Perianth tube short campanulate, lobes similar lanceolate. Stamens 6, filaments broad connate in a ring often adnate to the perianth tube, anthers introrse very small. Pistil adnate to the staminal ring or nearly free from it. Style short. Stigmas 3, small recurved. Ovary 3 celled, ovules 3 or more anatropous. Fruit capsular splitting at the top when very young. Seeds 1-3 developed pushing through the top of the capsule, oblong light blue when ripe with a thick fleshy outer coat. Endosperm globular enclosing the embryo.

Species about 15. India, Siam and Malaya.

Flowers several to each bract	1. *P. Teta.*
Flowers solitary in each bract.	
Ovary superior.	
Flowers globose deep purple	2. *P. violacea.*
Flowers expanded green or purplish.	
Small $\frac{1}{3}$ inch across	3. *P. viridis.*
Large $\frac{1}{2}$ inch across	4. *P. lurida.*
Ovary inferior.	
Petals and sepals ovate white	5. *P. albida.*
Petals and sepals ovate yellow	6. *P. grandifolia.*
Petals and sepals linear green	7. *P. stellaris.*

1. P. Teta, Andr. Bot. Rep. t. 605. Leaves 4 or 5 petiole slender 6 inches long, blade narrowly lanceolate acuminate thinly coriaceous 5 nerved 6-9 inches long 1 inch wide. Raceme lax 8 inches tall rachis purple. Bracts ovate to ovate lanceolate cuspidate acuminate $\frac{1}{4}$ inch long. Flowers 2-3 in a tuft expanded $\frac{3}{4}$ inch across, pedicels shorter than the bracts. Sepals ovate subacute green edged violet. Petals shorter quite rounded at the tip dark green edged white. Staminal ring hardly elevated adnate to the petals almost to the top, dark violet. Style thick columnar 3 lobed nearly to the base, about as long as the stamens. Ovary completely inferior.

Bot. Mag. t. 1302, Kunth. Enum. V. 307, Redoute Lil. t. 415, Rchb. Ic. t. 14, Hook. fil. Fl. Brit. Ind. VI. 265, Ridl. Journ. As. Soc. Str. Br. p. 93. *Teta viridiflora*, Roxb. Fl. Ind. 2. 165.

Penang: Government Hill, Pulau Badak (Curtis 2757). Distrib. India, Siam.

2. P. VIOLACEA, Wall. Cat. 5084, Bak. Journ. Linn. Soc. XVII. 502. Rhizome ascending. Leaves ovate lanceolate to ovate acute or acuminate 9 nerved stiff, 7-8 inches long, 2½ inches wide, petiole 6 inches long. Raceme about 4 inches tall deep violet purple. Bracts broadly lanceolate acute papery, lower ones ½ inch long, upper ones smaller. Flowers crowded solitary to each bract, campanulate globose fleshy nodding deep black purple. Sepals and petals obovate obtuse ¼ inch long. Petals a little smaller. Staminal ring free from the perianth and the ovary. Pistil connate shorter than the staminal ring, ovules about 6 in each cell. Ovary superior. Seed oblong blue.

Hook. fil. Fl. Brit. Ind. VI. 266, Ridley l.c. 94.

Singapore: Bukit Timah (Ridley); Selangor: Kwala Lumpur (Ridley); Perak: Thaiping Hills, Kuala Dipang (Ridley), Upper Perak (Wray 3459); Penang: Government Hill (Curtis 139); Pahang: Tahan River (Ridley). Distrib. India.

Native name "Seludang Pinang." I believe this to be the plant intended by Baker but have not seen Wallich's plant. Baker gives three varieties of which two, viz. *minor* and *princeps* with green flowers are doubtless distinct. The almost globose nearly black flowers are very distinctive.

3. P. VIRIDIS, Ridley l.c. 95. A compact bushy plant with a stout rhizome. Leaves numerous lanceolate acuminate at both ends, plicate 7 to 8 inches long 1½ inch broad, nerves 5 or 7 raised, upper surface dark green shining, lower glaucescent, petiole 8-9 inches long. Raceme 5 inches long stout, with numerous lanceolate acuminate bracts at the base. Floral bracts 2 to each flower, outer one subquadrate with a linear point, inner lanceolate acute shorter. Flowers numerous nodding, pale emerald green. Sepals ovate $\frac{3}{16}$ inch long. Petals more oblong. Staminal ring free from the perianth and pistil except at base deep green rounded. Pistil about as long conic, ovary superior. Stigma obscurely 3 lobed. Seeds pale blue over ½ an inch long.

Singapore: Chan Chu Kang etc., (Ridley 1653, 6235); Malacca: Chabau, Herb. Bot. Sing.; Johor: Bukit Soga, Batu Pahat (Ridley). Distrib. Sumatra.

4. P. LURIDA, Ridley l.c. 96. Rhizome stout, roots thick. Leaves large, lanceolate with a long point, nerves 15 to 19, transverse nervules conspicuous, 12-13 inches long 3 to 3½ inches wide, petiole 8-12 inches long, stout. Raceme thick 4-5 inches long. Bracts outer

½ inch long lanceolate acuminate, inners ⅛ inch long. Flowers ½ inch across. Petals and sepals ovate spreading lurid green with a purple central line. Staminal ring circular deep violet. Pistil superior shorter conical with a short cone-shaped style. Ovules 2 in each cell.

Penang: Penara Bukit, on rocks (Ridley 7095); Pahang: Khol, Pahang river (Ridley); Malacca: Woods at the foot of Mount Ophir (Ridley).

Native name "Pinang Lumbah." Endemic.

5. P. ALBIDA, Baker Bot. Mag. t. 7110. Rhizome short and thick with corky roots. Leaves lanceolate acuminate, 8 ribbed, 10 inches long 2 inches wide, petiole over a foot long. Raceme 9 inches tall, covered with small white nodding flowers nearly to the base, lower bracts ½ inch long narrow lanceolate. Pedicels very short. Sepals and petals white ovate, petals rounder and blunter. Staminal ring round little elevated. Ovary half inferior adnate to the staminal ring for half its height, ovules about 5 in a cell. Style short cylindric. Hook. fil. Fl. Brit. Ind. VI. 267, Ridley l.c. 96.

Perak: Larut Hills; Penang: Government Hill (Curtis 2757.) Distrib. Borneo on Matang Mt. Sarawak.

6. P. GRANDIFOLIA, Ridl. l.c. 97. Rhizome subterranean. Leaves very large and stiff, coriaceous deep green oblanceolate cuspidate tapering at base, nerves 13; 12 inches long, 6 inches wide, petiole thick ¼ inch through, 6 inches long. Raceme flowering to the base, 6 inches long. Flowers nodding, solitary. Bracts lanceolate obtuse ¼ inch long. Sepals and petals ovate obtuse ⅛ inch long waxy yellow. Staminal ring adnate to the perianth, anthers broader than usual. Style very stout, top broad. Stigmas linear. Ovary obconic quite inferior.

Malay Peninsula probably Larut Hills, cult. in Botanic Gardens, Singapore, but locality lost.

7. P. STELLARIS, Ridl. l.c. 97. A small plant. Leaves several lanceolate acuminate with waved edges 5 ribbed, four inches long one inch across petiole 3 inches long. Raceme 2 inches long with numerous lanceolate bracts at the base. Flowers solitary in the bracts green star-shaped small. Outer bract lanceolate acuminate, inner one smaller. Sepals and petals linear obtuse, less than ⅛ inch long. Staminal ring green, the stamens almost completely free, filaments oblong fleshy. Anthers orange. Ovary quite inferior, rather large obconic. Style violet conical taller than the stamens. *P. humilis* Andr. Hook. fil. Fl. Brit. Ind. VI. 267, (partly).

Penang Hill (Curtis 142, Ridley 7253); Province Wellesley: Tasek Gelugur (Ridley); Pahang: Tahan Woods (Ridley). Distrib. Siam.

3. Ophiopogon, Ker.

Stem creeping short or erect elongate. Leaves linear or lanceolate nerves parallel. Scape racemose. Bracts scarious. Flowers small pink or white several to a bract. Perianth superior. Stamens 6 free on the bases of the segments, filaments short. Ovary inferior three celled. Style columnar. Stigma 3 toothed. Ovules 2 in each cell. Fruit and seed as in *Peliosanthes*. Species 8 to 10. India, China, and Japan.

Stamens quite free ... ... 1. *O. malayanus.*
Stamens united by a short fleshy ring ... ... 2. *O. prolifera.*

1. O. malayanus, Ridl. Journ. Roy. As. Soc. S. Br. Vol. 41, p. 34. Stem erect stout 4 or more inches long covered with scarious sheaths of the fallen leaves roots long and woody. Leaves linear acuminate falcate striate, 9 inches long $\frac{3}{8}$ inch wide, glaucous beneath. Scape 4 inches long, base nude. Flowers small white. Bracts 2 base broad ovate apex linear, outer one $\frac{1}{4}$ inch long. Pedicel longer. Sepals and petals ovate subacute $\frac{1}{8}$ inch long. Stamens connivent, filaments very short, anthers lanceolate. Style terete longer.

Perak: Padang Rengas (W. Fox), Lankawi, Gunong Raya (Curtis 2643). Distrib. Borneo.

This seems quite distinct from any form of the common Indian *O. intermedius*, Don. differing in its tall stout stem, broad leaves and ovate perianth lobes.

2. O. prolifera, Lindl. Journ. Hort. Soc. 1, (1846) 76. Root-stock climbing and rooting. Leaves 6 to 10 inches long $\frac{2}{3}$ inch across, broad ensiform, decurved bright green. Scape stout bright purple. Flowers subsessile clustered between fleshy and spongy. Stamens united by a short fleshy ring. Ovary 3 celled. Ovules 2 in each cell erect. Style pyramidal. Stigmas 3 point-like. Miq. Fl. Ned. Ind. III. 569. Hook. fil Fl. Brit. Ind. VI. 270.

Fluggea prolifera, Bak. Journ. Linn. Soc. XVII. 502. Penang (T. Lewis) cultivated in the Horticultural Society's Gardens in 1844.

This has not been met with again, nor do any specimens appear to be extant, unless it is a plant with a stout creeping rhizome and very long deep green leaves which occurs on rocks at the top of Penang Hill and on the Larut Hills at the altitude of about 2500 feet. This plant has however never been seen in flower either in the wild state nor under cultivation.

§ 3. Anthericeae.

4. Chlorophytum, Ker.

Herbaceous plants roots often tuberous. Leaves long usually linear, thin flaccid crowded at the base. Inflorescence racemose or

panicled. Flowers small or medium-sized white, pedicellate. Sepals and petals similar linear oblong. Stamens 6, filaments filiform anthers linear versatile. Ovary globose trilocular. Ovules 4-20 in each cell. Style elongate filiform. Stigma minute capitate. Capsule trigonous deeply 3 lobed, lobes flattened. Seeds discoid black, albumen abundant.

Species about 40. Africa and India, a few in the Malay, Australian and American regions.

C. ORCHIDASTRUM, Lindl. Hort. Trans. VI. 79, Bot. Reg. t. 813. A large tufted plant with flaccid elliptic lanceolate acuminate leaves about 2 feet long and 2 inches wide. Panicles tall 12 to 18 inches long rather stout with a few long branches. Bracts at the base of the branches long papery acuminate 1 to 3 inches long. Flowers numerous in twos and threes, scattered white. Pedicels $\frac{1}{4}$ inch long. Sepals and petals lanceolate acute. Capsule $\frac{1}{4}$ inch long, $\frac{3}{8}$ inch wide retuse. Seeds rounded flat black wrinkled.

Kunth. Enum. IV. 603, Baker Journ. Linn. Soc. XV. 325, Hook. fil. Fl. Brit. Ind. VI. 336. *C. Nimmoni*, Dalz. Hook. Kew Journ. Bot. II. 142. *Anthericum Nimmoni* Grah. Cat. Bomb. Pl. 252. *Phalangium oligospermum* Wight Ic. t. 2038.

Perak, Kuala Dipang, on limestone rocks (Ridley). Distrib. India, Cambodia, Tropical Africa.

5. DIANELLA, Lam.

Herbs rootstock usually branched. Leaves stiff distichous linear bases equitant. Scapes tall panicled. Flowers small blue or white nodding, pedicels jointed at the top. Sepals and petals 6, narrow spreading or recurved. Stamens 6 hypogynous, filaments thick, anthers linear basifixed opening by pores. Ovary 3 celled ovules 4 to 8 in a cell. Style filiform, stigma minute capitate. Berry blue or white. Seeds few ovoid flattened black.

Species 7 or 8. Chiefly Australian and Polynesian, one Indian, African and Malayan also.

D. ensifolia, Red. Lil. t. 1. Stems leafy flattened tufted 1½-6 feet tall $\frac{1}{2}$ inch across. Leaves distichous linear lanceolate acuminate 2 feet long, 1½ inch wide, sheathing base 6 inches long. Scape 2 feet long. Panicle 6 inches or more, pedicels persistent $\frac{1}{2}$ inch long. Flowers $\frac{1}{4}$ inch long, blue or greenish white. Sepals linear subacute. Petals thinner and broader, all violet or greenish yellow. Stamens shorter. Anthers yellow. Berry blue or white $\frac{3}{8}$ inch through. Seeds 5-6, ovoid $\frac{1}{8}$ inch wide.

Kunth. Enum. V. 50, Baker. Journ. Linn. Soc. XIV. 576, Benth Fl. Austral. VII. 16, Bot. Mag. t. 1404, Miq. Fl. Ind. Bot. III. 560, Hook. fil. Fl. Brit. Ind. VI. 337. *D. odorata*, Bl. Enum. I. 14, Kunth.

l.c. 51. *D. nemorosa* Lam. Encycl. II. 276, Jacq. Hort. Schoenbr. I. 49, Miquel l.c. Roxb. Fl. Ind. II. 164. *D. javanica* Miq. l.c. 561, Kunth. l.c. 52. *D. sandvicensis*, Hook. and Arn. Bot. Beech. Voy. 97. *Rhuacophila javanica* Bl. l.c. 14. *Anthericum Adenanthera* Forst. Prodr. No. 149. *Phalangium Adenanthera* Poir. Encycl. V. 252.

Common over the whole peninsula up to 4000 alt.

Singapore: Pulau Ubin (Hervey 487), Tanglin etc., (Ridley); Selangor: Ulu Selangor (Ridley 10629); Malacca: Bukit Bruang (Derry 331); Perak: Thaiping (Wray 4281), Gunong Batu Putih at 4300 feet elevation (Wray 1024); Province Wellesley: Kubang Semang (Curtis 2422).

Native names "Satagit," "Siak-Siak jantan," "Lenjuan," "Senjuang." Distrib. Mascarene Islands, Indo-Malaya, Australia and Polynesia.

§ 4. ASPIDISTREAE.

6. TUPISTRA, Ker.

Herbaceous plants, stem short stout erect or creeping. Leaves large petioled. Scape short or tall stout, spike many flowered. Flowers fleshy rather large yellow or purple. Perianth campanulate short and broad, lobes 6 or 8 recurved. Stamens 6 or 8 inserted on the middle of the tube included, filaments very short, anthers dosifixed. Ovary small sessile 3 to 4 celled. Style short stout. Stigma large peltate or capitate entire or lobed. Ovules 2 in a cell. Berry globose usually containing one large seed only.

Species about 10. Tropical Himalayan and Burmese.

Flowers $\frac{3}{4}$ inch across. Stigma orbicular flat	1. *T. grandis.*
Flowers $\frac{1}{2}$ inch across. Stigma clubbed ...	2. *T. violacea.*

1. T. GRANDIS, Ridl. Journ. Bot. March 1900 p. 73. Stem stout 3-4 or more inches tall. Leaves lanceolate acute deep green, 24 inches long, 6 inches wide. Spike erect 12 inches or more tall. Flowers 50 or more 1 inch long $\frac{3}{4}$ inch across. Bracts ovate very small purple. Perianth tube campanulate purple nearly black. Anthers 6 sessile oblong white. Style stout taller than the tube. Stigma very large rounded short flat depressed in the centre. Ovary trilocular, ovules 2 in each cell. Bot. Mag. t. 7829.

Perak: Bujang Malacca (Ridley), Batang Padang at 2000 feet alt. (Wray 1470). Endemic. In dense wet forest.

2. T. VIOLACEA, Ridl. Journ. Roy. As. Soc. S. Br. Vol. 41, p. 35. Stem short and stout. Leaves broadly oblong oblanceolate acute narrowed gradually to the base, 3 feet long 3 inches wide, dark green stiff. Spike very dense about 8 inches tall. Flowers sessile $\frac{1}{2}$ inch across,

tube hemispheric violet, lobes oblong recurved darker. Anthers 6 sessile, elliptic. Style cylindric white spotted with violet. Stigma club-shaped rounded obscurely three-lobed.

Perak: Bujong Malacca (Curtis), fl. in. H. B. Penang in 1901; Penang: Highlands (Curtis). Endemic.

EXCLUDED SPECIES.

Tupistra singapureana, Wall. Cat. 5195. Bak. Journ. Linn. Soc. XIV. 581, Hooker Fl. Brit. Ind. VI. 325, is *Neuwiedia Curtisii* Rolfe. In fruit.

§ 5. ASPARAGEAE.

7. ASPARAGUS, L.

Shrubby plants with a stout rhizome. Stems erect or straggling or climbing. Leaves reduced to minute scales, often spiny, with tufts of flattened or acicular branches (cladodes) in the axils. Flowers very small, axillary, fascicled, solitary racemose pendulous on jointed pedicels. Perianth campanulate 6 lobed. Stamens from the bases of the segments. Ovary 3 celled, 3 angled, ovules 2 or more in each cell. Style 1, stigmas 3. Berry globose. Seeds 2 to 6, black, testa brittle.

Species about 100. Europe, Asia, temperate and tropic Africa.

A. sp. A portion of a stem with cladodes but without flowers, was brought from Lankawi by Mr. Curtis' collector. It is unidentifiable but may be *A. racemosus* Willd.

§ 6. DRACAENEAE.

8. DRACAENA, L.

Trees or shrubs. Leaves linear sessile or lanceolate petioled, nerves many parallel. Flowers in terminal panicles or racemes, white or pink. Bracts small. Sepals and petals linear narrow more or less connate into a tube. Stamens 6 inserted at the base of the tube, filaments long filiform, anthers narrow versatile. Ovary 3 celled, ovules 1 in each cell erect. Style filiform. Stigma capitate. Berry globose red 1 to 3 seeded. Seeds globose or hemispheric albumen horny, embryo, small.

Species about 40. African, tropical Asiatic and Australian.

Panicles or racemes erect, branches short and stiff.

Leaves linear acuminate sessile.

Trees branched 20 to 60 feet tall.

Leaves narrow linear acuminate ... ... 1. *D. granulata.*

Leaves 2 inches across, panicle large ... 2. *D. brachystachis.*

Shrubs little or not branched. Panicles with few short or no branches. Leaves narrow linear acuminate sessile.

Raceme dense long ... ... 3. *D. conferta.*
Raceme lax, sometimes branched ... ... 4. *D. graminifolia.*
Leaves linear lanceolate sessile ... ... 5. *D. Porteri.*
Leaves oblanceolate petioled.
Stem 2-3 feet tall ... ... 6. *D. terniflora.*
Stem weak a foot long ... ... 7. *D. singapurensis.*
Stems 3 inches or less.
Leaves long petiole. Panicle short dense 8. *D. congesta.*
Leaves short petioled. Flowers crowded campanulate very short ... ... 9. *D. breviflora.*

Panicle large erect.

Tree, leaves oblanceolate petioled ... 10. *D. Maingayi.*
Shrub leaves lanceolate... ... ... 11. *D. penangensis.*
Tall shrubs hardly branched.
Leaves large, marbled, petiole indistinct 12. *D. aurantiaca.*
Leaves long petioled lanceolate ... ... 1.3 *D. Jackiana.*
Shrubs. Panicles nodding branches long slender.
Leaves narrow linear ... ... 14. *D. nutans.*
Leaves large oblanceolate ... ... 15. *D. pendula.*
Leaves small lanceolate ... ... 16. *D. elliptica.*

1. D. GRANULATA, Hook. fil. Fl. Brit. Ind. VI. 327. A tall elegant tree 20 to 60 feet tall. Stem 4 inches through or more much branched above, densely leafy, bark smooth white. Leaves linear acuminate dark green, bases clasping the stem 6 to 10 inches long $\frac{1}{4}$ to $\frac{1}{2}$ inch wide. Panicle rather lax a foot long about 6 inches across, branches suberect rather slender. Flowers somewhat distant an inch long, whitish green pedicel $\frac{1}{4}$ inch long. Perianth tube split about half way down base dilated lobes linear. Stamens as long as the lobes, filaments fairly stout. Stigma clubbed. Fruit globose orange $\frac{3}{4}$ to 1 inch through.

D. graminifolia, Ridl. Journ. Bot. 1896, p. 2. (not Wallich).

Singapore: Bukit Timah (Ridley 3587a), Bukit Mandai (3800); Johor: Scudai river; Perak: dense wet jungle with 200 feet of sea level, Larut (King's Collector 6808).

Endemic. In swampy forests.

D. granulata, Hook, fil. is based on a single specimen in fruit, and I take it to be the same as the Singapore plant though the branches of

the panicle are stouter and I have not seen fruit of the Singapore plant. It is quite possible however that there are two species here.

2. D. BRACHYSTACHIS, Hook. fil. Fl. Brit. Ind. VI. 328. A tree about 20 feet tall, but little branched. Leaves tufted at the ends of the branches 2 to 3 feet long 2 inches wide, coriaceous dark green ensiform acuminate with a long point, keel stout base passing into the petiole which is dilated at the base. Panicle large peduncle stout woody over 2 feet long, and $\frac{1}{2}$ inch through at the base, branches 5 or more about a foot long scaberulous. Bracts at the bases of the branches $1\frac{1}{2}$ inch long lanceate cuspidate. Flowers 2 to 4 in a tuft $\frac{1}{2}$ inch long white, pedicels $\frac{1}{8}$ inch long. Perianth lobes free for about $\frac{1}{2}$ their length blunt. Filaments rather thick. Style stout. Stigma rather large capitate. Berry 1 to 3 seeded large globose or 3 lobed orange. Endemic.

Singapore: Pulau Serapu (Ridley 10128); Malacca: Hulu Belangkan (Derry 1087); Selangor: Bukit Kutu (Ridley 7770); Perak: Hermitage Hill (Ridley); Penang: Moniot's Road (Curtis 2302).

Occurs scattered over the peninsula in forest not very rare. The name "brachystachys" (a most unsuitable name) is probably a misprint for trachystachys referring to the scaberulous panicle. Endemic.

3. D. CONFERTA, Ridl. Journ. Roy. As. Soc. S. Br. Vol. 44, p. 35. Stem 6 to 10 feet tall. Leaves narrow linear acuminate 24-27 inches long $\frac{3}{4}$ inch wide base broadly sheathing, midrib very strong at the base thining upwards and disappearing before the apex. Raceme 2 feet long erect, base with numerous reduced leaves with a broad base acuminate upwards, peduncle rather stout with few small sheathing leaves, inflorescence long dense. Flowers white 3 or 4 in a tuft with very short pedicels, and 2 or 3 ovate acuminate bracts $\frac{1}{8}$ inch long at base. Perianth tube $\frac{1}{4}$ inch long narrow lobes linear $\frac{1}{4}$ inch long. Fruit globose as large as a pea.

Perak: Selama 3-500 feet (King's Coll. 3149); Malacca: or Sungei Ujong (Cantley's Collector). "Poko San Juan hutan jantan." Endemic.

4. D. GRAMINIFOLIA, Wall. Cat. 5149. A low shrub about 2 feet tall, little or not branched, stem slender not $\frac{1}{4}$ inch through. Leaves linear acuminate 15 inches long $\frac{1}{4}$ inch wide, strongly keeled, sheathing base rather broad. Raceme simple or with few branches, 12 to 18 inches tall erect, base nude except for some linear bracts. Flowers 3 to 4 in a tuft, numerous white an inch long, on pedicels $\frac{1}{8}$ inch long tube very narrow dilated at the base, lobes linear free for more than half their length. Fruit small globose orange. Hook. fil. Fl. Brit. Ind. VI. 327. *D. Finlaysonii*, Bak. Trim. Journ. Bot. 1873, 261, Journ. Linn. Soc. XIV. 525.

Dindings : (Finlayson Wall. Cat. 5149), Pangkor (Ridley 7250), Lumut (Ridley 8395) ; Perak : Bujong Malacca.

var. *angustissima*, Leaves very narrow with long slender points.

Perak, Gunong Putih (King's Coll. 8073). Endemic.

5. D. PORTERI, Bak. Journ. Bot. 1873, 262, Journ. Linn. Soc. XIV. 529. A low little branched shrub 2 to 5 feet tall, with the stem as thick as a pencil. Leaves linear acuminate or linear lanceolate, 12 to 15 inches long ½ to 1½ inch wide, narrowed at the base into a petiole dark green. Inflorescence erect racemose, or with a few short branches a foot long, branches when present 1 or 2 inches. Bracts at the base of branches linear acuminate. Flowers in two and threes white ¾ inch long lobes linear blunt, free for more than ½ their length, tubes slightly dilate at the base. Filaments rather slender. Berry ⅜ inch through 1 to 3 seeded orange. Hook. fil. Fl. Brit. Ind. VI. 328. *D. terniflora* var. *Curtisii* Hook. fil. l.c. 329.

Singapore : (Wallich 5148B), Garden jungle (Ridley) ; Johor : Gunong Pulai (Ridley) ; Malacca : (Griffith 5874), (Maingay 1687), Ayer Panas, Mount Ophir (Ridley 3148); Selangor : Petaling (Ridley) ; Penang : Waterfall (Porter and Wallich Cat. 5148a).

Common in woods. Native name "Jarum-Jarum Padang." Hooker l.c. says that Wallich's plant 5148a has spotted leaves. I have examined this and see no spots on it.

6. D. TERNIFLORA, Roxb. Fl. Ind. II. 159. A low shrub 2 to 3 feet tall. Leaves elliptic to elliptic lanceolate cuspidate dark green, 5 to 9 inches long 3 inches wide ; petiole 1 to 2 inches long channelled and hardly winged. Inflorescence hardly or not branched racemose erect 12 inches long, base with lanceolate acuminate bracts. Flowers 5 or 6 in a tuft white, pedicels ⅛ inch long. Perianth a little over an inch, split about ½ way down, lobes linear obtuse. Stamens as long. Berry globose or 3 lobed 1 to 3 seeded orange. Hook. fil. Fl. Brit. Ind. VI. 329. Regel. Revis. Drac. 16. *D. ternifolia* Kurz For. Fl. II. 545.

Singapore : Garden jungle, Changi (Ridley 4758) ; Johor : Tanjong Surat and Jambu Larang (Feilding) ; Malacca : Sungei Hudang (Ridley 1357) ; Pahang : Tahan River (Ridley 2393) ; Perak ; Dindings : Lumut (Ridley) Kol (King's Coll. 10,511), Larut (King's Coll. 2719) ; Penang : Balik Pulau, and Coast (Curtis 901).

7. D. SINGAPURENSIS, Ridl. Journ. Bot. Apr. 1896, p. 4. A dwarf plant with rather a weak stem a foot tall, ¼ inch through. Leaves elliptic or lanceolate acute to subacute 7 inches long by 2½ inch wide, dull, dark green, petiole deeply grooved slightly winged 2 inches long or less. Bracts small ovate acute. Pedicels ⅛ inch long. Raceme short 2 inches long. Flowers crowded in threes. Perianth nearly cylindric, tube split more than ½ way down, lobes lorate white. Stamens shorter. Anthers conic. Style longer. Fruit small globose red.

Singapore: Pukit Timah; Chan Chu Kang (Ridley 6235); Johor: Gunong Panti (Ridley). In dense forest local. Endemic.

8. D. CONGESTA, Ridl. Trans. Linn. Soc. III. 388. Stem short hardly 3 inches long. Leaves lanceolate acute or caudate or elliptic caudate dark green, 6 to 9 inches long inches wide, petiole 3 to 6 inches long. Panicle compact 3 inches long on a 2 inch peduncle. Flowers very crowded in groups of 2 or 3, reddish white an inch long, pedicels hardly $\frac{1}{8}$ inch long. Bracts small ovate acute. Perianth tube split for $\frac{1}{3}$ its length dilate at the base lobes linear obtuse. Stamens slender. Anthers oblong. Berry small 1 to 3 seeded.

Selangor: Kwala Lumpur Caves (Ridley); Pahang: Kota Glanggi; Tahan woods (Ridley).

On limestone rocks. Distrib. Borneo.

9. D. BREVIFLORA, Ridl. Journ. Bot. Apr. 1896, p. 4. A dwarf nearly stemless plant. Leaves dark green lanceolate acuminate 12 inches long, 3 inches wide, petiole deeply channelled not winged. Raceme short and dense 2 inch inches long peduncle as long. Leaf at base of the raceme convolute. Bracts at the base of the raceme numerous densely crowded greenish white in threes. Bracts small ovate, pedicels $\frac{1}{8}$ inch long. Perianth tube campanulate $\frac{1}{4}$ inch long split $\frac{1}{2}$ way down, lobes oblong blunt recurved. Stamens as long tapering upwards. Anther cells diverging at the base.

Johor, Ulu Batu Pahat (Lake and Kelsall). In swampy forests Tebrau river (Ridley 12,017, 12,212). Endemic.

10. D. MAINGAYI, Hook. fil. Fl. Brit. Ind. VI. 329. A very large tree about 40 feet tall with numerous branches forming a dense crown. Stem 2 to 3 feet through. Leaves lanceolate oblong acuminate deep shining green, 12 inches long and 3 inches wide, but often narrower in proportion, petiole an inch long winged to the base. Panicles terminal 2 feet long branches stout spreading. Bracts lanceolate acuminate. Flowers yellow an inch long in tufts of about 5, rather remote $\frac{1}{2}$ inch apart or less. Bracteoles short ovate lanceolate $\frac{1}{8}$ inch long. Pedicels $\frac{1}{4}$ inch long. Berries as large as cherries globose orange. Ridley Journ. Bot. l.c. 2.

Singapore: Changi (Ridley 4413), Bukit Panjang (5919); Johor: Batu Pahat; Malacca: Pulau Besar (Griffith), Bukit Bruang Ridley); Selangor: Ulu Selangor (King's Coll. 8666); Perak: Larut (King's Coll. 3564). Distrib. Malay Islands.

Common especially in sandy and rocky woods near the sea. The biggest species in the Malay Peninsula. Native name "Chemou."

11. D. PENANGENSIS, Ridl. Journ. Roy. As. Soc. S. Br. Vol. 41, p. 36. Stems about 8 or 10 feet tall, an inch through. Leaves young oblong petioled, adults shorter, upper leaves lanceolate acuminate 6-7

inches long 1-1¼ wide, petiole 1 inch long sheathing at base. Panicle erect 8-10 inches long of about 11 or 12 stiff branches 4 inches long or less with lanceolate acuminate bracts at the base ¼-½ inch long. Flowers in twos and threes on slender pedicels ¼ inch long. Perianth lobes narrow white. Fruit as large as a large cherry 1-3 seeded scarlet.

Penang, Batu Feringhi by the stream; Highlands (Curtis 2269). A shrub resembling in many points *D. Maingayi* but much smaller. Endemic.

12. D. AURANTIACA, Wall. Cat. 5744, Hook. fil. Fl. Brit. Ind. VI. 329. A shrub or small tree little or not branched about 12 feet tall. Leaves crowded on the ends of the branches coriaceous very variable lanceolate, elliptic lanceolate, ovate acuminate, or almost lorate cuspidate, tapering to the base, 1 to 3 feet long, 4 or 5 inches across, petiole winged polished green, or purple, marbled with ring-shaped lighter patches. Panicle erect terminal stout about 1½ feet long branches spreading thickly floriferous. Bracts 1 inch long ½ inch wide lanceolate acuminate. Flowers usually purple outside white within, more rarely green or greenish white, slender 1 inch long, in tufts of 3 or 4 with very small ovate bracts. Pedicels ⅝ inch long. Stamens as long as the perianth. Style longer. Fruit as big as a large cherry 1 to 3 seeded, seeds white semitranslucent globose or hemispheric. Ridley Journ. Bot. l.c. 3. *D. Cantleyi*, Baker Journ. Bot. 1881, 326. *D. spicata* var. *aurantiaca*, Bak. Journ. Bot. 1873, 263, Journ. Linn. Soc. XIV. 532. *D. marmorata*, Bak. Bot. Mag. t. 7078.

Singapore: (Wallich 5744), Bukit Timah (Ridley 4682), common. Johor; Malacca: Nyalas, Panchor (Goodenough); Penang: Paya Terobong (Curtis).

Damp spots in woods and open places. Distrib. Borneo.

13. D. JACKIANA, Wall. Cat. 5145. Stem rather short and slender. Leaves elongate lanceolate acuminate with a long winged petiole 24 inches long 2½ inches wide. Panicle shorter than the leaves graceful lax with few branches erect. Bracts lanceolate acuminate acute. Flowers in tufts of 2 or 3 on slender pedicels ⅛ inch long white long. Perianth split for ⅔ of its length, tube narrowed towards the base then dilated lobes linear. Anthers oblong. *D. longifolia*, Ridl. Trans. Linn. Soc. III. 388. *D. pachyphylla*, Hook. fil. Fl. Brit. Ind. VI. p. 329. (in part).

Pahang: Tahan River woods (Ridley); Perak: Larut 100 to 1000 alt. (King's Collector 2719); Penang: (Wallich 5145); Johor: Jaffaria (King and Hullett) probably but too young.

Dr. Prain states that the above-mentioned Larut plant exactly matches Wallich's 5145, *D. Jackiana*. I have not seen the specimen and no complete description of it has been published. Baker Journ.

Linn. Soc. XIV. 532, confuses it with *D. aurantiaca* Wall. under the name *D. spicata* var. *aurantiaca* and Hooker l.c. p. 331 puts it under imperfectly known species. Endemic.

14. D. NUTANS, Ridl. Trans. Linn. Soc. III. 406. Tall shrub with slender stems about 10-12 feet tall ¼ inch through much branched. Leaves narrow linear acuminate mucronate 12 inches long ½ inch wide bright green. Panicle 2 feet long nodding branches 6 to 7 inches long very slender. Bracts small ovate acute brown. Flowers single or in pairs on pedicels ½ an inch long, greenish white cylindric base dilated, 1½ inch long, split for two-thirds of their length, lobes spathulate linear obtuse. Stamens shorter filaments yellow. Style longer. Fruit small 1 to 2 seeded orange, as large as a pea.

Pahang, Ayer Hitam near Pekan (Ridley). Endemic. A slender half sarmentose shrub, in damp thickets.

15. D. PENDULA, Ridl. Journ. Roy. As. Soc. S. Br. Vol. 41, p. 36. Stem moderately stout about 6 feet tall. Leaves broadly oblong lanceolate acuminate narrowed to the base and subpetiolate, petiole winged 8 to 14 inches long, 1½-3½ inches wide. Panicle graceful nodding 15 inches or more long with few distant branches, slender 7 or 8 inches long. Bracts small ovate lanceolate. Flowers in tufts of 2 or 3 distant white, on pedicels ⅛ inch long, slender ⅜ to nearly 1 inch in length split for half their length, lobes linear dilated upwards. Stamens about as long, anthers oblong.

Dindings: on Gunong Tungul (Ridley 9448); Malacca: Panchur (Goodenough 1745); Perak: Kwala Dipang (King's Coll. 8279), and Gopeng (4643). Endemic.

Inhabits swampy woods. The Malacca plant has broader more distinctly petiolate leaves, and the rachis of the panicle is stouter, but I take it to be the same plant.

16. D. ELLIPTICA, Thunb. Diss. Bot. Drac. 6. A slender stemmed shrub 5 to 6 feet or more tall, branches drooping. Leaves broad oblong or lanceolate 6 inches long 3 inches across dull green, petiole ½ an inch long. Panicle long lax with slender nodding branches 6 inches to a foot long. Flowers ⅜ inch long solitary or in pairs white pedicels slender ¼ inch long. Bract ovate acuminate very small. Perianth tube split more than half way down, lobes narrow linear. Filaments very slender. Fruit globose ½ inch through or 2 to 3 lobed 1 to 3 seeded, seeds globose. Kunth. Enum. V. 14. Bak. Trim. Journ. Bot. 1873, 263, Journ. Linn. Soc. XIV. 534, Kurz. For. Flor. II. 544, Hook. fil. Fl. Brit. Ind. VI. 330. *D. maculata* Roxb. Fl. Ind. II. 158.

Singapore: Garden jungle (Ridley 4412), Chan Chu Kang; Johor, Tanjong Kupang (Ridley), Gunong Panti; Perak: Larut (Kunstler 2958); Selangor: Caves, Kwala Lumpur (Ridley).

var. *B. gracilis*. Leaves narrow lanceolate 5 inches long 1½ across, panicle and flowers smaller. This is a mountain form connecting the low and broad leaved one with the next. *D. gracilis*, Wall. Cat. 5150, Hook. fil. l.c.c. *D. atropurpurea* var. *gracilis*, Bak, Trim. Journ. Bot. 1873, 264, Journ. Linn. Soc. XIV. 534.

Malacca: Mount Ophir, at 4000 feet elevation (Ridley 5150): Perak: Gunong Hijau, Larut Hills, at 5000 feet (Ridley 5035); Penang; West Hill (Curtis 1186); Kedah; Gunong Jerai (Ridley).

var. *C. montana*. Stem scandent much branched. Leaves very narrow acuminate lanceolate 4 inches long ½ to ¾ inch wide. Panicles short 2 inches long with few branches often borne laterally on the old wood. Bracts ovate large in proportion to the flower. Flowers purple.

Perak: Larut Hills, Gunong Hijau (Ridley, King's Collector 6350) at 5500 feet elevation.

Though these three forms are very different in appearance I have little doubt that they are specifically identical, and are merely local varieties, as they certainly pass into each other in Perak. Some of the synonyms given for *D. elliptica* in the Flora of British India, may belong to distinct plants, but if not the species occurs in Silhet and Khasia, Burma, Andamans, and Nicobars, Sumatra, Java and Borneo.

D. elliptica var. *maculata*, Bot. Mag. 4787, is certainly very distinct from any form I have seen both in its short suberect panicle and short thick flowers.

Excluded Species.

D. pachyphylla, Kurz. Flor. For. II. 546, Hook. fil. Fl. Brit. Ind. VI. 329. A native of the Andaman Islands. The Malay peninsula plants referred to it by Hooker are apparently both *D. Jackiana*, Wall.

Cordyline terminalis, Kunth. Enum. V. 25. the Dracaena of Gardens is not a native of the Peninsula, nor though it is often cultivated does it ever seem to establish itself even as an alien. The specimens of var. *Sieberi*, quoted from "Malacca Griffith and Maingay" must have been from a garden. The plant is known as "Andong" by the Malays.

§ 7. Smilaceae.

9. Smilax, Linn.

Climbing rarely erect shrubs, often thorny. Leaves alternate rarely opposite, ovate or lanceolate petiolate, 3 to 5 nerved reticulate, petiole often bearing two tendrils near the base. Flowers dioecious small umbelled green or yellow. Perianth segments 6 free. Stamens in male flowers 6 or more from the base of the perianth, free filaments filiform. Anthers oblong staminodes in female flower 3 or 6. Style

short or absent. Stigmas 3 recurved. Ovary trigonous 3 celled, ovules 1 or 2 in each cell. Fruit a berry with one, two or three seeds hemispheric or globose. Albumen horny. Embryo small.

Species about 200, all temperate and tropical regions.

Small erect shrub, anthers sessile	1. *S. calophylla.*
Climbers.	
Anthers nearly sessile	2. *S. myosotiflora.*
Filaments long or moderately so.	
Stems rather slender, leaves small or moderate size.	
Branches unarmed.	
Fruit small. Leaves lanceolate acute ...	3. *S. laevis.*
Fruit small. Leaves elliptic	4. *S. extensa.*
Fruit small. Fruit as large as a cherry ...	5. *S. megacarpa.*
Branches thorny.	
Ribs of leaf free to the base.	
Umbels an inch across	6. *S. Helferi.*
Umbels half an inch across	7. *S. zeylanica.*
Ribs connate above the base. Stem closely thorny	8. *S. polyacantha.*
Stems stout leaves large ovate; petiole with a large sheath.	
Leaves white on the back.	
Stems hispid	9. *S. barbata.*
Stems thorny, not hispid	10. *S. leucophylla.*
Leaves not white on the back.	
Branches roughly scabrid	11. *S. aspericaulis.*
Branches prickly.	
Leaves perfectly glabrous	12. *S. Kingii.*
Leaves tomentose on the back... ...	13. *S. Blumei.*

1. S. CALOPHYLLA, Wall. Cat. 5131, A. De C. Monogr. Smilax 60. A slender erect shrub about 2 feet tall, with a wiry slender unarmed stem. Leaves 4 to 6 inches long ¾ to 1½ inch wide lanceolate acuminate 3 nerved, base acute dark green above glaucous beneath, petiole ¼ to ½ inch long. Umbels very small sessile or nearly so. Male flowers globose yellow. Sepals hooded concave oblong obovate obscurely keeled. Petals smaller ovate flat. Anthers sessile on a disc, oblong ovoid white. Berry ⅓ inch through globose red. Seed globose big as a pea, red brown. Hook. fil. Fl. Brit. Ind. VI. 303.

Singapore: Garden Jungle, Bukit Timah, etc., (Ridley); Johor: Tanjong Bunga; Johor Bahru (Ridley); Malacca: Mount Ophir

(Hullett); Pahang: Pulau Tawar, and Kota Glanggi (Ridley), Kluang Terbang (Barnes 10,899); Selangor: Bukit Kutu (Ridley); Perak: Larut Hills (King's Coll. 1961, 4108); Penang Hill (Ridley); Kedah: Gunong Jerai (Ridley 5553).

In woods and forests up to an altitude of 4000 feet. Native names "Dawi-Dawi," "Dedawi," "Sadawi." Used as an aphrodisiac. A very variable little shrub in the size and breadth of leaves. Endemic.

2. S. MYOSOTIFLORA, A. De C. Monogr. Smilax 65. A slender climber on bushes and low trees. Stem smooth four-angled. Leaves dark green herbaceous shining oblong ovate or lanceolate caudate acuminate three-nerved, finely reticulate 4 to 6 inches long $\frac{1}{2}$ to 3 inches wide base cuneate to cordate, petiole twisted $\frac{1}{4}$ to $\frac{3}{4}$ inch long, sheath short ribbed tendrils long slender. Peduncle slender an inch long, pedicels nearly $\frac{1}{4}$ inch. Flowers numerous in a globose umbel, green, male flowers. Sepals ovate obtuse. Petals narrower lanceolate. Stems 6. Anthers oblong nearly sessile. Female flowers nearly $\frac{1}{4}$ inch across. Sepals and petals as in male, globose. Style broadly linear. Stigmas broad obcuneate. Berry globose $\frac{3}{8}$ inch long 1 or 2 seeded. Hook. fil. Fl. Brit. Ind. VI. 303. *S. extensa*, Wall. Cat. (in part).

Singapore: Garden jungle (Ridley 6050); Johor: Gunong Panti (Ridley); Malacca: Bukit Sabukor (Ridley 1525), Mount Ophir; Negri Sembilan: Gunong Angsi (Ridley); Perak: Dindings, Lumut (Ridley), Larut Hills (King's Coll. 2748), Gopeng (King's Coll. 4805, 5802), Ulu Slim (10,687), Selama (King's Coll. 3137); Penang: (Porter Wall. Cat. 5126 A); Kedah: Gunong Jerai (Ridley).

A low climber in woods to an altitude of 4000 feet. Native name "Akar Ali." The roots chewed as an aphrodisiac. Endemic.

3. S. LAEVIS, Wall. Cat. 5116, A. De C. Monogr. Smilax 56. A slender unarmed climber. Leaves dark green coriaceous lanceolate or ovate lanceolate acute, nerves 3 free to the base, 2 or 4 inches long 1 inch wide, petiole twisted $\frac{1}{2}$ inch long base dilated. Peduncle to 1 inch long unbranched. Basal bracts ovate coriaceous. Umbels small $\frac{1}{2}$ inch across. Flowers very small greenish white, pedicels slender, $\frac{1}{6}$ inch long. Sepals and petals linear obtuse. Stamens 6, filaments linear very little longer than the oblong obtuse anthers. Fruit small less than $\frac{1}{4}$ inch long, pedicel $\frac{1}{4}$ inch. Hook. fil. Fl. Brit. Ind. VI. 803. *S. oxpyhylla* Kunth. Enum. V. 239.

Malacca: Mount Ophir (Griffith 5450); Perak: Gunong Keledang (Ridley 9571), Larut Hills (Fox H. B. Singap. 10,684), (King's Coll. 4140), Gunong Bubu (Wray 3837); Penang Hill (Wallich 5116), (King's Coll. 1320, 5206), (Ridley 9333); Kedah: Gunong Jerai (Ridley). Distrib. China.

On trees and shrubs at an altitude of 2500 feet to 5000 feet. De Candolle l.c. makes the Ophir plant above quoted, a variety under the

name var. *Ophirense* on account of its strongly reticulated leaves. The plant however like most species in the genus is very variable in form and texture of the foliage.

4. S. EXTENSA, Wall. Cat. 5126 B. A. De C. Monogr. Smilax 179. Stem rather slender unarmed. Leaves coriaceous shining elliptic or oblong lanceolate 3 to 6 inches long 1½ to 3 inches wide, acute abruptly narrowed into the petiole, ribs 3 free to the base, with a slender intramarginal vein, reticulations conspicuous when dry, petiole stout ½ inch long sheathing ½ way. Umbels 1 to 3 on a very short corm on peduncle with a lanceolate acute bract at the base; secondary peduncles slender with lanceolate acuminate bracts at the base. Pedicels slender ⅛ inch long. Flower bracts lanceolate acute small. Sepals linear obtuse. Petals narrowed. Stamens rather long filaments filiform. Anthers narrow linear. Hook. fil. Fl. Brit. Ind. VI. 309.

Penang, Government Hill, (Porter in Wall. Coll. 5126 B) (Curtis 1244, 458). Endemic.

5. S. MEGACARPA, A. De C. Monogr. Smilax 186. Stem thorny at base, branches terete stout unarmed. Leaves oblong to elliptic rounded or retuse at apex, narrowed or broad at base coriaceous, ribs 3 from above the base, 3 to 8 inches long, 1 to 6 inches wide, reticulations usually conspicuous when dry, petiole stout twisted ½ to 1½ inch long sheathed about ½ way, tendrils stout about 10 inches long. Peduncle stout subtended by an ovate bract, secondary peduncles 2 to 3 stout woody 1 inch long in fruit. Umbels ½ an inch through, pedicels in flower very short. Male flowers little more than ¼ inch long. Sepals linear oblong narrow. Petals ½ as wide. Stamens longer, filaments slender long. Anthers linear. Female flowers larger. Sepals and petals similar to those of the male. Staminodes 3 short filaments. Pistil large flask-shaped, style distinct thick, stigma 3 lobed. Berry as big as a cherry globular yellow. Seeds 2 discoid flat. Hook. fil. Fl. Brit. Ind. VI. 311.

Singapore: Tanglin (Ridley 4815, 5106) Bukit Mandai (Ridley 4600); Malacca: (Maingay); Malacca: Pindah (Ridley 1137), Panchur (Ridley 1403), Batang Malaka (Derry 908); Dindings: Lumut (Ridley 10,351), Larut (King's Collector 4177, 5776 and 5084); Penang: Balik Pulau (Ridley 9477). Distrib. India, Tonkin.

Native names "Akar Banau," "Akar Rabana," "A. K'luna," A. Rabanu," "A. Lampau Bukit." The tubers are eaten by the wild tribes. The young leaves are dark green mottled with grey, adult leaves deep shining green.

6. S. HELFERI, A. De. C. Monogr. Smilax 176. A rough climber, stems woody longitudinally ribbed with numerous recurved thorns, internodes 3 inches long. Leaves oblong obtuse rounded at both ends very variable in size, with ribs 3 meeting at the base, and reticulations

large, 2 to 5 inches long, ¾ to 3 inches wide, petiole short ¼ inch long twisted and ribbed, tendrils very slender. Umbels an inch across solitary or 2 or 3 on a common peduncle ½ inch inch long, bracteate below the middle. Bract lanceolate acuminate. Buds nearly cylindric ½ inch long, pedicels (in flower) slender ¼ inch. Male flowers. Sepals and petals nearly obtuse, the latter narrower. Stamens 6, filaments linear rather slender ⅔ the length of the petals. Anthers narrow recurved. Berries globose as large as peas usually 1 seeded on pedicels ½ inch long. Hook. fil. Fl. Brit. Ind. VI. 302. *S. luzonensis*, Presl. Rel. Haenk. I. 131.

Pahang: Pekan and all up the Pahang river (Ridley 1149); Sungei Ujong: Gunong Berembun, (Cantley) Seremban (Ridley); Malacca: (Griffith), Ayer Panas (Ridley 1749), Bukit Bruang; Perak: Tambun (Ridley 9570), Ulu Bubong (King's Coll. 10,239), Gopeng (King's Coll. 6003), Lankawi (Curtis); Province Wellesley: Krian (Ridley); Kelantan: Kamposa (Ridley).

Common in thickets in open country. Native names "Akar Kulona betina," "Akar Gadung Tikus." Distrib. Pegu and Tenasserim.

7. S. ZEYLANICA, L. Sp. Pl. 1029. Woody climber 30 to 40 feet long. Stems rather slender more or less 4 angled, with a few thorns. Leaves elliptic, broadly oblong or ovate oblong apex rounded blunt, or cuspidate 2 to 7 inches long 1 to 4 inches wide, ribs 3 to 5 from above the base, petiole ¼ to 1 inch long very shortly sheathing. Umbels solitary or 2-3 on a common peduncle, small ½ inch across. Pedicels ¼ inch long. Flowers green. Sepals ⅙-¼ inch long linear. Petals narrower. Stamens as long. Berries ½ inch through. Seeds 2 planoconvex.

A. De C. Monogr. Smilax 190. Hook. fil. Fl. Brit. Ind. VI. 310. Trimin. Fl. Ceyl. IV. 283. *S. indica*, Vittm. Summa. V. 422. A. De C. l.c. 187. *S. Hohenackeri* Kunth. Enum. V. 240.

Perak, Larut (King's Coll. 7727, 3365). Distrib. India and Java.

8. S. POLYACANTHA, Wall. Cat. 5127. Kunth. Enum. V. 239. Branches terete as thick as a crowquill closely prickly, prickles short straight. Leaves elliptic lanceolate acuminate at both ends 3 to 5 ribbed from the base 4 to 6 inches long by 1½ to 2 inches wide, petiole stout narrowly sheathing below the middle tendrils slender. Umbels solitary or 2 on a very short stout ½-1 inch peduncle, many flowered, receptacle ovoid. Bracteoles minute ovate. Female flowers very small. Ovary with short recurved styles. A. De C. Monogr. Smilax 176. Hook. fil. Fl. Brit. Ind. VI. 311.

Penang, (Porter Wall. Coll. No. 5127).

This does not seem to have ever been met with again in the Peninsula.

9. S. BARBATA, Wall. Cat. 5125. A. De C. Monogr. Smilax 196. Stems long and stout nearly half an inch through terete covered with red or whitish bristles, mixed with conic thorns. Leaves ovate cuspidate, base usually broad, coriaceous dark green above, white beneath, ribs 5 connate above the base nervules strongly reticulate, 6-8 inches long 3 to 6 inches wide, petiole stout 1½ inch long sheath swollen bristly with a pair of simple tendrils reddish 6 to 8 inches long. Peduncles bristly 1½ inch long spreading 5 branched. Bracts at base 2 ovate stiff coriaceous. Pedicels ⅓ inch long, to ½ inch long (in part). Umbels in flower ½-¾ inch across. Male flowers green. Sepals linear oblong. Petals narrower. Stamens 6, filaments long narrow linear. Anther oblong. Female flowers perianth as in male. Staminodes 3, minute tooth-like. Ovary globose. Styles 3 linear recurved. Fruit globose dark red as large as a pea ¼ inch through, 2 seeded. Hook. fil. Fl. Brit. Ind. VI. 306. *S. setosa*, Miq. Fl. Ind. Bat. Suppl. 610.

Singapore: (Wallich 5125), Tanglin, Jurong, Bukit Timah (Ridley 4811, 8043, 4760) (King 1141); Malacca: Sungei Hudang (Derry 33), Ayer Panas (Goodenough 1550; Perak: Larut Hills (Ridley) to 2000 feet alt. Distrib. Banca.

Very common in thickets in Singapore. Native names "Akar Banok," "Akar Kuranting Jantan."

10. S. LEUCOPHYLLA, Blume Enum. 18. A stout species. Stem woody subterete more or less thorny. Leaves lanceolate, ovate or oblong cuspidate base rounded dark green above glaucous beneath ribs 3 strong connate above the base 6 to 11 inches long, 3 to 6 inches wide, petiole about an inch long, sheath large and dilated, tendrils rather slender. Common peduncle short about an inch long branches 3 or 4 slender 1½ inch long, thicker and twice as long in fruit. Umbels ½-1 inch across, pedicels slender ¼ inch long. Buds in male clavate cylindric. Petals and sepals linear narrow. Stamens with slender filaments and linear anthers. Fruit globose nearly half an inch through grey. A. De C. Monogr. Smilax 200. Kunth. Enum. V. 250. Hook fil. Fl. Brit. Ind. VI. 313.

Singapore: Tanglin; Bukit Mandai (Ridley 10,413); Johor: Pulau Dayong (Feilding); Selangor: Bukit Hitam (Ridley 1972); Perak: Larut Hills (King's Collector 3669), Chanderiang (King's Collector 5719); Penang: Penara Bukit (Curtis 1145). Distrib. Java, Borneo, Cochin-China.

Common in the low country of the Peninsula and up to 5000 feet elevation on Kinabalu (Haviland).

11. S. ASPERICAULIS, Wall. Cat. 5129. A. De C. Monogr. Smilax 195. Stems terete scabrid unarmed or thorny. Leaves oblong or linear oblong bases rounded or cuneate, thin, 3 nerved above the base 2 to 8 inches long, 2 to 3 inches wide, petiole ½ to 1 inch long. Umbels

many flowered, solitary or 2 or 3 on a common peduncle ½ inch long. Buds clavate ¼ inch long. Male flowers, sepals linear oblong ¼ inch long, petals very narrow. Stamens as long as the sepals. Berries nearly ½ an inch through. Hook. fil. Fl. Brit. Ind. VI. 306. *S. Roxburghiana*, Wall. Cat. 5115 (in part). *S. odoratissima* Bl.

Perak: Larut Hills (King's Coll. 2924); Selangor: Ginting Bidai (Ridley). Distrib. India, Andaman Islands.

In hill woods about 2,000 feet alt. rare.

12. S. KINGII, Hook. fil. Fl. Brit. Ind. VI. 307. Stem 20 to 40 feet long, branches very stout granulate 4 angled, with scattered conic thorns. Leaves very large coriaceous perfectly smooth, ovate acuminate, orbicular ovate or elliptic 5 to 12 inches long, 6 inches or less wide, ribs 3 free to base, nervules obscure, petiole stout twisted 2-3 inches long, sheath very broad cymbiform, tendrils very stout. Umbels 1 to 3 on a very short common peduncle partial peduncles 1 to 3 inches long, pedicels 1½ to 2 inches long. Female flowers pink, sepals broadly oblong lanceolate obtuse; petals very narrow. Staminodes 3. Ovary oblong. Style ⅓ as long, stigma much longer than the style. Berry 1 inch through.

Perak, Larut Hills at 300 to 500 feet (King's Collector 4171, 3914). Endemic.

13. S. BLUMEI, A. De C. Monogr. Smilax 202. Stout climber 20 to 25 feet long, stems terete prickly, Leaves large coriaceous ovate or orbicular ovate acute or obtuse 7 ribbed, ribs and reticulating nerves elevated on the back and deeply sunk on the upper face, back of leaves tomentose 8 to 24 inches long, petiole 2 inches long stout, sheathing portion 1 inch sides inflexed tips acute. Umbels on a short stout common peduncle 1-3 inches long, receptacle in fruit large globose, pedicels 1 to 1¼ inch long. Hook. fil. Fl. Brit. Ind. VI. 313. *Smilax perfoliata*, Blume Enum. 18 (not Loureiro).

Malacca: (Maingay); Perak: Ulu Bubong (King's Coll. 10,598), Larut Hills (Ridley) common at an altitude of 2000 feet. Distrib. Java.

DOUBTFUL SPECIES.

S. sp. Branches stiff woody with small scattered thorns. Leaves oblong lanceolate cuspidate coriaceous 4 to 5 inches long 1½ to 2 inches long, ribs 3 deeply impressed on the upper surface, petiole stout ½ an inch long abruptly bent in the middle, sheath small not enlarged. Peduncle unbranched, stout over half an inch long. Fruit globose as large as a pea (when dry) pedicels ½ an inch long. Flowers not seen.

Selangor, Bukit Hitam (Kelsall, Herb. Bot. Gard. Sing. 1973). Dr. Prain says matches *S. extensa* Wall. Cat. 5126, but it does not at all fit the description in A. De C. Monogr. Smilax 179.

S. singaporensis, A. De C. Monogr. Smilax 177. *S. calophylla* Wall. Cat. 131, Herb. Richard. Differs from *S. Helferi* in its scanty thorns, shorter sheath of the petiole, base of blade obtuse, bract at the base of the raceme more cuspidate, female flower larger, stigmas longer more papillose; without male flowers difficult to distinguish from S. India. This may possibly be *S. Helferi*, but that has not been found since in Singapore, nor do I know of any plant like this in the Island. It appears that in distributing Wallich's duplicates the specimens of Smilax got mixed and the specimen on which this species was based may perhaps not have come from Singapore at all.

10. HETEROSMILAX, Kunth.

Climbers with the habit of *Smilax* but the perianth tubular, apex trifid to 6-fid. Stamens 3 filaments connate. Fruit a 2 seeded berry.

Species 5. India, Malaya, China, Japan.

H. INDICA, A. De C. Monogr. Smilax 43. Stem slender unarmed obscurely angled. Leaves ovate lanceolate acuminate base rounded rather thin, 3 to 8 inches long 1 to $3\frac{1}{2}$ inch wide, ribs 5 connate at base petiole 1-$1\frac{1}{2}$ inch long geniculate above; no sheath, tendrils slender. Peduncle solitary, axillary stiff compressed 2 inches long, umbel an inch through. Male flowers $\frac{3}{16}$ inch long, apex trifid. Stamens 3 connate about half way up. Anthers elliptic ovate with a short cusp. Fruit globose $\frac{1}{2}$-$\frac{3}{4}$ inch through. Seeds 2 hemispheric. Hook. fil. Fl. Brit. Ind. VI. p. 314.

Singapore, thickets near Tanjong Katong. (Hullett). Rare. Distrib. India.

XI. PONTEDERIACEAE.

Herbs growing in open marshes and fresh water, with a short rootstock, and erect or floating leaves parallel-nerved. Flowers in spikes or racemes from the axil of the upper leaf, bisexual, blue or white. Bracts sheathing. Sepals 3 and petals 3 free, fugacious. Stamens 6, one usually longer. Ovary free 3 celled or one celled with three parietal placentas. Style slender. Stigma entire or more or less bilobed, ovules anatropous. Capsule membranous. Seeds minute, ribbed. Albumen horny, embryo cylindric.

About 36 species, tropics of both hemispheres.

1. MONOCHORIA, Presl.

Marsh plants. Leaves radical and solitary at the top of the stem or branches, petioled, lamina ovate. Perianth widely expanded or campanulate blue. Stamens 6, five sterile, one longer fertile.

Species 5 to 6. Tropics of the old world.

Leaves hastate or cordate. Flowers long-pedicelled ... ... 1. *M. hastaefolia.*

Leaves ovate to linear. Flowers short-pedicelled ... ... 2. *M. vaginalis.*

1. M. HASTAEFOLIA, Presl. Rel. Haenk. II. 128. Rhizome usually short. Leaves several 1 to 2 feet tall, petiole sheathing at the base, blade hastate or deltoid, base broad or cordate, 2 to 6 inches long 2-6 inches wide. Flowers crowded on a short 2 inch raceme included in the sheath of the leaf, rachis $1\frac{1}{2}$ inch long or less, pedicels $\frac{1}{2}$ to 2 inches long. Sepals oblong obtuse $\frac{1}{2}$ inch long. Petals broader, all violet with green keels. Stamens 4 yellow short with violet filaments fertile, one longer olive green. Style stout curved. Stigma capitate. Capsule oblong globose nearly $\frac{1}{2}$ inch long. Seeds oblong ribbed numerous. Kunth. Enum. IV. 133. Miq. Fl. Ind. Bat. III. I. 548. Hook. fil. Fl. Brit. Ind. IV. 362. *M. hastata*, Solms. Laub. A. De C. Monogr. Phan. IV. 523. *M. dilatata*, and *M. sagittata* Kunth. l.c. 134. *Pontederia hastata*, Linn. Fl. Zeyl. 129. Mantissa 363. Roxb. Fl. Ind. II. 121. Corom. Pl. II. 6, t. 63. *P. saggitata*, Roxb. Fl. Ind. II. 124. *P. dilatata* Andrews, Bot. Rep. VII. t. 490. Buch. Ham. Syme's Embassy 475. Plate.

Singapore: Galang; Orchard Road etc., (Ridley); Malacca: Nyalas (Derry 233); Sungei Ujong: Kwala Pedas (Ridley); Penang: Pekan (Ridley); Perak: Ulu Slim (King's Coll. 10,889); Penang: (Curtis) Province Wellesley. Distrib. India, Malay Archipelago and China.

Native name "Chacha Layer;" "Kangkong Ayer." Common in ditches and swamps.

2. M. VAGINALIS, Presl. Rel. Haenk. II. 128. Rhizome long creeping, or short. Leaves scattered on the rhizome or tufted, petioles about 6 inches long, blade ovate lanceolate or ovate acute base rounded, dark green 1 to 2 inches long $\frac{1}{2}$ to 1 inch wide. Bracts narrow lanceolate $\frac{1}{2}$ inch long. Raceme an inch long 2 to 3 flowered. Flowers blue $\frac{1}{4}$ to $\frac{3}{8}$ inch across. Sepals linear oblong $\frac{1}{4}$ inch long violet, keel green. Petals broader and darker coloured. Stamens 6, 5 short, filaments filiform thickened at the base violet. Anthers small elliptic, sterile, 1 much larger, stouter. Anther large linear oblong. Ovary elliptic conic. Style stout alternate upwards. Stigma lateral linear. Capsule oblong nearly half an inch. Seeds minute elliptic longitudinally ribbed. Kunth. Enum. IV. 134. Solms-Laubach A. De C. Monogr. IV. 524. Miq. Fl. Ind. Bat. III. 548. Hook. fil. Fl. Brit. Ind. VI. 363.

Pontederia vaginalis, Linn. Mantissa 228. Roxb. Fl. Ind. II. 121. Cor. Pl. II. t. 110.

Singapore: Tanglin, Loyang (Ridley 6688). Ang Mo Kio (Ridley 4598); Malacca: Bukit Panchur, (Ridley); Pahang: Pekan, Kwala Tembeling (Ridley 1572); Selangor: Ulu Selangor (Ridley 10,518).

Province Wellesley, Permatang Bertam (Ridley); Penang: (Curtis); Perak: Ulu Bubong (King's Coll. 10,645).

Common in ditches. " Rumput Ayer."

var. *plantaginea*, Solms. Laub. l.c. A very much smaller plant with narrow, often linear leaves, *M. pauciflora*, Kunth. Miquel l.c. *M. linearis* Miq. l.c. *Pontederia plantaginea* Roxb. l.c. 123. *P. pauciflora* B. Enum. Fl. Jav. I. 32.

Singapore: Tanglin, etc., (Ridley); Malacca: Malacca Pindah (Hervey); Perak: Ulu Bubong (King's Coll. 10,645).

Common in ditches, merely a much smaller form than the type and passing into it. Distrib. India, Malaya, Japan, China, Tropical Africa.

XII. PHILYDRACEAE.

Herbs with narrow linear leaves. Inflorescence spicate or panicled, flowers small, bisexual irregular. Bracts rather large. Perianth lobes 2 inferior, petaloid. Stamen 1, on the base of the anterior segment, filament stout. Anther spirally twisted or straight. Staminodes 2 petaloid. Ovary free, 3-1 celled, placentas 3 parietal, ovules anatropous. Style stout, stigma capitate. Capsule 3 valved. Seeds numerous elliptic pustulate. Albumen fleshy.

PHILYDRUM, Banks.

Panicle tall erect.

PH. LANUGINOSUM, Banks. Gaertn. Fruct. I. 62, t. 16, f. 10. Leaves ensiform acuminate light green 18 inches long $\frac{1}{2}$ inch wide. Stem 30 inches tall $\frac{3}{64}$ inch through reddish. Spike simple or more often branched. Bracts at base ensiform acuminate sheathing 3 inches long. Floral bracts lanceolate acuminate woolly $\frac{1}{2}$ inch long. Perianth lobes fugacious yellow woolly lanceolate $\frac{1}{4}$ inch long. Stamen filament stout. Anther cells twisted spirally, pollen yellow. Staminodes alternate lanceolate thin yellow. Pistil conic densely silky. Capsule oblong reddish woolly $\frac{1}{2}$ inch long. Seeds elliptic pustulate brown.

Kunth. Enum. III. 380. Bot. Mag. t. 783. Roscoe in Trans. Linn. Soc. VIII. 342, t. 20. Miq. Fl. Ind. Bat. III. 250. Guillen. Ic. Pl. Austr. t. 5. Benth. Fl. Austral. VII. 74. Griff. Notul. III. 231. Ic. Pl. As. t. 269, 270. Hook. fil. Fl. Brit. Ind. VI. 363. *Garciana Cochin-Chinensis*, Lour. Fl. Cochin-Ch. I. 15.

Singapore: Bedok (Ridley 5909); Malacca: Common in rice fields, Bukit Sabukor, Tanjong Kling, Ayer Panas (Ridley 1576); Province Wellesley (Curtis 2874). Distrib. Burmah, Andamans, China, Malay Archipelago, China.

In shallow water. Native name " Rumput Kipas."

XIII. XYRIDEAE.

Tufted herbs, with stiff linear grassy leaves. Scape simple, naked slender. Flowers sessile in a short terminal head or spike of stiff dark brown rounded imbricating bracts, bisexual fugacious yellow. Bracteoles (or sepals) 3 boat-shaped or obovate, unequal. Petals 3 clawed orbicular often denticulate yellow. Stamens 3, with sagittate anthers. Staminodes 3 often bearded. Ovary free imperfectly 3 celled placentas 3, ovules many. Ovules anatropous. Style trifid. Stigmas capitate. Capsule loculicidally 3 valved. Seeds numerous very small linear or ellipsoid.

XYRIS, L.

Characters of the order. Distribution, tropics of both hemispheres, about 80 species.

Leaves quite flat.

Robust leaves broad $\frac{1}{4}$-$\frac{1}{2}$ inch	1. *X. indica.*
Slender wiry, leaves stiff narrow $\frac{1}{10}$-$\frac{1}{6}$ inch	2. *X. anceps.*

Leaves hardly flattened narrow.

Scape slender tall 2 edged	3. *X. pauciflora.*
Scape slender terete tall	
Leaves long. Heads $\frac{1}{4}$ inch through ...	4. *X. Ridleyi.*
Leaves very short. Heads $\frac{1}{8}$ inch ...	5. *X. bancana.*

1. X. INDICA, Linn. Sp. Pl. 62. A large tufted plant with fibrous roots. Leaves linear acute or obtuse flat herbaceous 1½ feet long, $\frac{1}{4}$ inch wide. Scape stout grooved angled 2 feet tall. Capitulum globose $\frac{1}{4}$ to $\frac{1}{2}$ inch through or oblong $\frac{3}{4}$ inch long. Bracts orbicular dark brown with a paler edge $\frac{1}{8}$ inch wide. Flowers yellow $\frac{1}{2}$ inch across. Bracteoles winged serrulate. Petals claw as long as the sepals, limb orbicular erose. Anther oblong, obtuse, base acute. Vahl. Enum. II. 204. Roxb. Fl. Ind. I. 179. Mart. in Wall. Pl. As. Rar. III. 30. Kunth. Enum. IV. 20. Miq. Fl. Ind. Bat. III. 528. Steud. Syn. Pl. Cyp. 288. fil. Fl. Brit. Ind. VI. 364. Trimen. Fl. Ceyl. IV. 297.

Malacca: Rice fields near Bukit Sabukor (Derry 227); Selangor: (Cantley's Coll.); Province Wellesley (King's Coll. 1619); Penang: (Curtis 1927), Lankawi, Kwah (Ridley). Distrib. India, Ceylon, Malay Islands, Siam.

Native name "Rumput Bagau;" "Jeringu Padang." Rice fields and wet open swamps.

2. X. ANCEPS, Lam. Ill. I. 132. Tufted plant with strong wiry roots. Leaves numerous rigid often twisted, linear acuminate, bases broad often red and polished, 4 inches to 24 long $\frac{1}{8}$ inch wide. Scape slender often twisted 6 to 24 inches or more ribbed. Capitulum ovoid

to cylindric ⅛ to ¼ inch long. Bracts light brown orbicular stiff convex with a narrow scarious margin. Bracteoles 2 keeled and spinulose boat-shaped, one obovate flat spinulose pale brown. Petals obcuneate orbicular clawed margins fimbriate bright yellow, ¼ inch across. Staminodes yellow with long processes on one side. Stamen filament fairly thick. Anther cells divaricate above and below toothed above. Ovary elliptic green. Vahl. Enum. II. 205. Kunth. Enum. VI. 17. Miq. Fl. Ind. Bat. III. 529. Steud. Syn. Cyp. 287. Hook. fil. Fl. Brit. Ind. VI. 364. Trim. Fl. Ceyl. IV. 297. *X. Walkeri*, Kunth. Enum. IV. 16. Miq. Fl. Ind. Bat. Suppl. 608. *X. malaccensis*, Steud. l.c. 287. *Xyris* No. 2. Griff. Notul. III. 123.

Singapore: Balestier Plain (Ridley 5878), Pulau Tekong, Changi (Ridley 1718); Johor: Tanjong Surat (Feilding H.B.S. 4096); Malacca: Pulau Besar (Ridley 63), Tanjong Kling (Ridley 3129), Merlimau Derry 1217); Pahang: Pekan (Ridley); Negri Sembilan; Seremban: (Ridley 10003). Distrib. India, Burmah, Malay Islands.

Common in sandy open country.

3. X. PAUCIFLORA, Willd. Phytogr. I. 2, t. 1. f. I. Sp. Pl. I. 255. Leaves thin grassy very narrowly linear acuminate, margins (when dry) thickened and scaberulous 3-10 inches long $\frac{1}{16}$ to $\frac{1}{8}$ inch wide. Scapes rather slender, 6 to 15 inches long terete, with two keels. Head globose or ovoid few flowered. Bracts orbicular convex pale brown with a broad green margin. Bracteoles keeled. Petals broadly ovate.

Vahl. Enum. II. 207. Br. Prodr. 256. Mart. in Wall. Pl. As. Rar. III. 29. Miq. Fl. Ind. Bat. III. 529. Steud. Syn. Cyp. 287. Hook fil. Fl. Brit. Ind. VI. 365. Trimen. Fl. Ceyl. IV. 298. *X. oryzetorum*, Steud. l.c. 286.

Singapore: Reservoir (Hullett, Ridley 5740), Balestier Plain (5877); Pahang: Pekan (Ridley 1026); Province Wellesley, Bukit Juru (Ridley 7105); Lankawi Islands, Kwah (Ridley 8305). Distrib. India, China, Malay Archipelago, Australia.

Damp grassy spots.

4. X. RIDLEYI, Rendle Journ. Bot. Vol. 37, (1899) p. 505, Pl. 403, fig. 12-16. Leaves narrowly linear herbaceous bases dilated reddish 7 to 8 inches long $\frac{1}{16}$ inch wide. Scapes several slender 15 inches long subterete with a keel on each wide. Capitula obovoid ¼ inch or more long. Bracts ovoid dark brown keeled few. Sepals paler, linear falcate scabrid, not keeled. Fruit oblong unilocular, placentas 3 prominent. Seed ellipsoidal.

Kedah, Gunong Jerai, grassy spots at 3000 feet alt. (Ridley 5050). Endemic. Rare.

5. X. BANCANA, Miq. Fl. Ind. Bat. Suppl. 608. Dwarf plants solitary, with slender fibrous roots. Leaves flat linear acuminate very

narrow, reddish at base 1 to 1¼ inch long. Scapes 1 or few very slender terete reddish 9 to 10 inches long. Capitulum small?few-flowered: obconic about ⅛-¼ inch long. Bracts ovate subacute keeled brown. Bracteoles linear lanceolate strongly ciliate. Hook. fil. Fl. Brit. Ind. VI. 366.

Malacca, sandy places near the sea (Griffith, Maingay); Pahang Pekan (Ridley 1,026b). Distrib. Banca, Labuan.

Sandy open spots.

XIV. COMMELINACEAE.

Herbs erect or ascending, rarely climbing. Leaves thin petioled, and sheathing with parallel nerves. Inflorescence panicled or racemose. Flowers bisexual rarely unisexual. Perianth inferior. Sepals 3 herbaceous. Petals 3 thin fugacious, blue, pink, white or yellow. Stamens 6, all perfect or 2 or more reduced to staminodes, filaments often bearded. Anthers oblong or globose. Ovary free 2-3 celled. Style 1. Stigma small. Ovules orthotropous 1 or few in the inner angles of the cells. Capsule loculicidal or indehiscent. Seeds angled, sometimes arillate.

Species about 300, tropical and subtropical both hemispheres.

Fruit indehiscent, crustaceous.
Stout plants, inflorescence terminal ... 1. *Pollia.*
Capsule loculicidal.
Flowers bisexual
Stamens 3 perfect, with 1-3 staminodes
Cymes solitary in a spathe ... ... 2. *Commelina.*
Cymes panicled, not in a spathe ... ... 3. *Aneilema.*
Stamens 6.
Cymes from imbricating bracts terminal ... 4. *Cyanotis.*
Flowers panicled terminal ... ... 5. *Floscopa.*
Cymes lateral, large hairy plants ... ... 6. *Forrestia.*
Flowers unisexual, males terminal panicled.
Females cymose in a spathaceous bract ... 7. *Spatholirion.*

1. Pollia, Thunb.

Large herbs, with lanceolate petioled leaves. Panicle terminal, lax or dense. Sepals 3. Petals free. Stamens 6 or 3, with 3 staminodes, filaments short naked. Ovary 3 celled, many ovuled. Capsule globose or ovoid blue or white fragile. Seeds angled smooth.

Species about 15. India, Malaya, China, Australia.

Panicle short dense	1. *P. thyrsiflora.*
Panicle short lax few flowered	2. *P. sumatrana.*
Panicle lax spreading many flowered	3. *P. sorzogonensis.*

1. P. THYRSIFLORA, Endl. Gen. 1029. Stem stout ½ inch through creeping below ascending for about 2 feet. Leaves oblanceolate acuminate narrowed into a broad petiole, glabrous 10-15 inches long, 3-4 inches wide, petiole 2 inches long. Panicle dense sessile or nearly so ovoid 1-3 inches long puberulous. Bracts ovate. Stamens 6 perfect. Fruit elliptic deep steel-blue ¼ inch long. Seeds numerous compressed triangular or subquadrate, black punctate.

Hassk. in Pl. Jungh. 150, and Comm. Ind. 57. Clarke, Comm. and Cyrt. Bengal. t. 33. Monogr. 124. Hook. fil. Fl. Brit. Ind. VI. 367. *P. glaucescens* Teysm. and Binn. Nat. Tijdr. Ned. Ind. XXIV. 305. *Tradescantia thyrsiflora* Bl. Enum. I. 6. *Lamprocarpus thyrsiflorus* Bl. in Schultes f. Syst. VII. Add. 1726.

Selangor: Ginting Bidai (Ridley 7652); Kwala Lumpur: (Curtis); Pahang: Tahan River (Ridley); Perak: Waterloo (Ridley). Distrib. Andaman Isles, Java, Celebes, Philippines. Not rare in hill districts especially on the main chain.

2. P. SUMATRANA, Hassk. Commel. Ind. 56. Stem creeping and rooting ascending rather slender about a foot long. Leaves elliptic acuminate with a long point thin scabrid above thickly pubescent beneath 5 inches long 1¼ inch wide, midrib and petiole (half an inch long) covered with red hairs. Panicle short about an inch long pubescent branches short. Sepals oblong hairy. Fruit elliptic enclosed in the persistent sepals, nearly ¼ inch long.

Perak, Hermitage Hill (Ridley). Rare. Distribution. Malay Islands.

A very little known plant, of which I have seen no other specimens but I believe from the description this is rightly identified.

3. P. SORZOGONENSIS Endl. Gen. 1029. Stem tall erect rather slender. Leaves lanceolate acuminate base narrowed into a petiole or sessile 6 to 8 inches long 2½ inches wide glabrous or puberulous beneath, sheaths pubescent. Panicle pubescent on a peduncle 2 to 4 inches long. Branches an inch long. Flowers white. Sepals elliptic concave ⅛ inch long. Petals orbicular. Stamens 3, filaments short filiform, anthers oblong curved. Ovary elliptic. Style filiform. Capsule subglobose ¼ inch long blue. Seeds trapezoid. Miq. Fl. Ind. Bat. iii 451. Clarke Monogr. 126. Hook. fil. Fl. Brit. Ind. VI. 367. *Aclisia sorzogonensis* E. Meyer, Presl. Rel. Haenk. i. 138, t. 25. Hassk. Comm. Ind. 48.

Singapore: Pulau Ubin (Ridley 4759); Malacca; Selandor (H.B.S.): Selangor: 15th mile Pahang Track (Ridely 8459), Ginting

Bidai (7651); Perak: Kenring (Wray 54), Tomoh (Machado). Distrib. India, Ceylon, Burmah, Malay Archipelago, China, New Caledonia.

Native names "Tebu K'loi," "Seburas," "Pakululoi." Fruit eaten by natives. Common in rocky woods, usually in hill districts.

2. COMMELINA, Linn.

Herbs usually slender and creeping, ascending. Flowers in short branched cymes, enclosed in a complicate or funnel-shaped green spathe, terminal on the branches. Sepals 3, herbaceous, blue or white. Stamens 3 perfect and 3 sterile. Ovary 3 or 2 celled, 2 cells with 1 to 2 ovules, 1 empty or 1 ovuled. Style short. Stigma small capitate. Capsule thin oblong beaked retracted into the spathe loculicidal. Seeds ellipsoid, or angled pitted or reticulate.

Species about 90. Tropics and sub-tropics of both hemispheres. Weak or prostrate herbs, stems slender.

Leaves ovate lanceolate, suberect ...	1. *C. nudiflora.*
Leaves narrow lanceolate prostrate ...	2. *C. attenuata.*
Leaves elliptic	3. *C. benghalensis.*
Stout plant with large heads of funnel-shaped spathes	4. *C. obliqua.*

1. C. NUDIFLORA, l. sp. Pl. 41. Stem long creeping and rooting ascending thin. Leaves lanceolate acute 2-3 inches long ½ inch wide, base narrowed, sheaths ampliate ½ inch long. Spathes complicate peduncled ovate lanceolate ½-1½ inch long, peduncle ½ inch long. Cymes 2, branches 1 to 3 flowered. Sepals ovate boat-shaped white with a blue outer edge. Petals 2 reniform unguiculate ¼ inch long and wide, and one much smaller ovate reniform not clawed $\frac{3}{16}$ inch long, all cobalt blue. Stamens 6, 3 long with slender blue filaments. Anthers elliptic black 3 sterile with blue filaments and irregular pear-shaped divaricate anthers. Style very short shorter than the sterile stamens. Capsule elliptic beaked. Seeds cylindric reticulate black. Hook. fil. Fl. Brit. Ind. VI. 369. *C. communis* Walt. Fl. Carol. 68. Kunth. Enum. IV. 36. Clarke Comm. and Cyrt. Beng. t. I. Monogr. 144, t. I. f. 56. *C. cæspitosa* Roxb. Fl. Ind. I. 174. *C. diffusa* Burm. Fl. Ind. 18, t. 7, f. 2. *C. agraria* Kunth. l.c. 38. Hassk. Commel. Ind. 26. *C. salicifolia* Boj. Hort. Maur. 360 not of Roxb. *C. deficiens* Flor. des Serres t. 1824 not Hook. Whole peninsula in waste ground.

Singapore: Bajau (Ridley 4599) Toas (1757); Johor; Malacca; Sungei Ujong; Perak; Penang (Curtis 1224). Distribution, Africa, India, Malaya, Australia, Polynesia, North and South America.

Native names, "Rumput Aur," "Rumput Kukupu" and "Tapak Eti." The leaves are used for poulticing sores, and the shoots cooked

as a vegetable. The plant is rather variable in form of leaf etc., according to locality. I have met also with white-flowered forms.

2. C. ATTENUATA, Koen. Vahl. Enum. II. 168. A tufted creeping plant prostrate. Stems 12 inches long. Leaves narrow linear lanceolate recurved with a broad base 1 inch long $\frac{1}{8}$ inch wide or more, sheath short, hairy. Spathes narrow lanceolate recurved an inch long or less, peduncle slender $\frac{1}{2}$ inch long hairy. Flowers small bright blue on slender pedicels $\frac{1}{4}$ inch long. Sepals oblong. Petals orbicular. Stamens 3, filaments slender, anthers oblong undulate. Capsule subglobose or oblong $\frac{1}{4}$ inch long. Seed cylindric faintly reticulate channelled along one face, truncate at both ends with an appendage at both ends. Clarke Monogr. 172. Hook. fil. Fl. Brit. Ind. IV. 372. *C. rajmhalensis*, Clarke Journ. Linn. Soc. Bot. XI. 444. Comm. and Cyrt. Beng. t. 7.

Singapore: Changi (Ridley 3935, 9581), Galang etc. Sandy places near the sea, common. Distrib. India and Ceylon.

3. C. BENGHALENSIS, l. sp. Pl. 41. Low herb, stems creeping slender a foot long or less hairy or glabrous. Leaves elliptic ovate light green 1 to 3 inches long $\frac{1}{2}$ to 1 inch wide pubescent or with scattered hairs, petiole $\frac{1}{4}$ inch long winged. Spathes 1 to 3 turbinate half an inch long green. Flowers smaller than in *C. nudiflora*. Sepals oblong green as long as the claw of the petals. Petals 2, spathulate cochleate tips rounded, the other ovate hooded much shorter violet blue. Stamens 4, filaments slender violet. Anthers yellow cells divaricate at base. Style longer violet. Clarke Comm. and Cyrt. Beng. t. 4. Monogr. 159. Hassk. Comm. Ind. 28, 29. Miq. Fl. Ind. Bat. III. 533. Wight. Ic. t. 2065. Hook. fil. Fl. Brit. Ind. VI. 370. *C. nervosa* Burn. Fl. Ind. 18, t. 7, f. 3. *C. cucullata* L. Mantiss 176. *C. mollis* Jacq. Collect. III. 235 Ic. Rar. t. 293.

Singapore: Galang (Ridley 9152), Tanglin (3856); Malacca: Ayer Moley (Ridley 4597); Malacca Town (Ridley 10775); Sungei Ujong: (Cantley's Coll.).

A common weed in waste ground, called " Rumput Mayiam " by the natives. Distribution, Tropical Africa and Asia.

4. C. OBLIQUA, Ham. in Don. Prodr. Fl. Nepal p. 45. A stout erect plant with tall stems. Leaves lanceolate acute narrowed at both ends oblique, 6 inches long $1\frac{1}{2}$ wide glabrous, sheath broad an inch long strongly ribbed with bristles at the mouth. Spathes numerous crowded in a subsessile head, funnel-shaped pubescent about $\frac{1}{2}$ inch long. Petals blue inner ones clawed. Capsule ovoid 3 edged nearly $\frac{1}{4}$ inch long. Seeds elliptic black punctate. Clarke Commel. and Cyrt. Beng. t. 9, 10, 11. Monogr. 178. Hook. fil. Fl. Brit. Ind. VI. 372.

C. polyspatha Wight Ic. t. 2066. *C. maculata* and *C. striata* Edgew. Trans. Linn. Soc. XX. 89. *C. communis* Roxb. Fl. Ind. I. 171.

(not Linn). *C. paludosa* Bl. Enum. I. 2. *Heterocarpus obliquus* Hassk. Commel. Ind. 7.

Selangor, Ginting Bidai at 2000 feet alt ; (Ridley 7564). "Singapore" Hook. fil. l.c. is surely an error. Distrib. India, Ceylon, Malay Archipelago.

Excluded Species.

C. suffruticosa Bl. Enum. 3. Clarke Monogr. 188. Hook. fil. l.c. 374. "Malay Peninsula," no specific locality nor collector's name given in either of the latter works except the name of Zollinger who never visited the Malay Peninsula.

3. Aneilema, Br.

Herbs often tuberous rooted. Flowers small in axillary and terminal panicles, bracteate and bracteolate pink white or blue. Bracts not spathaceous. Sepals 3 free. Petals 3 equal obovate. Stamens 2 or 3, filaments naked or bearded, anthers oblong. Staminodes 2 to 4. Ovary sessile free 2-3 cells 1 to many ovuled. Capsule loculicidal, seeds 1 or more in each cell, with a hard wrinkled or dotted testa. Species about 60. Africa and Tropical Asia.

1. Tricarpellaria, Capsule 3 celled and 3 valved. Ovary cells 3-4 seeded.

Flowering stem tall erect leafy, leaves long	1. *A. lineolatum.*
Diffuse creeping plant, leaves ovate ...	2. *A. pauciflorum.*
Ovary cells 2 ovuled, capsule cells 2 seeded.	
Low herbs, decumbent, leaves short linear or lanceolate	3. *A. nudiflorum.*
Low herb tuberous. Leaves elongate linear.	4. *A. sinicum.*
Large stout herb 2 feet tall	5. *A. giganteum.*
Ovary cells 1 ovuled.	
Small herb with linear leaves	6. *A. vaginatum.*
Stout plant leaves lanceolate petioled ...	7. *A. conspicuum.*

1. A. lineolatum, Kunth. Enum. IV. 69. Stems leafy stout, about 15 inches tall. Lower leaves forming a rosette. Leaves elliptic lanceolate acute undulate 6 inches long by 1¼ inch wide, edges whitish glabrous, not petiole sheath ½ inch long hispid. Panicle terminal with long wide spreading branches. Sepals ovate oblong reddish broad cartilaginous. Petals white. Stamens 3 fertile very hairy with violet hairs 3 sterile less hairy. Ovary white. Capsule 3 angled oblong beaked ¼ inch, sepals persistent erect. Seeds about 3 in a cell black warty. Hassk. Pl. Jungh. 146. Comm. Ind. 36. Clarke Comm. and Cyrt.

Bengal t. 15, Hook. fil. Fl. Brit. Ind. VI. 376. *A. clatum* Kunth. l.c. 70. *A. latifolium* Wight. Ic. 2072. *A. herbacea* Roxb. Fl. Ind. I. 175. *C. lineolata* Bl. Enum. I. 3. *C. clata* Vahl. Enum. II. 178.

Selangor: Rawang (Ridley 8157); Pahang: Tahan River (Ridley 5823); Perak: Kwala Dipang (Ridley 9505), Tomoh (Machado), Lankawi, Kwah (Curtis 2680). Distrib. India and Malay Islands.

2. A. PAUCIFLORUM, Wight. Ic. Pl. 2077. Stem creeping succulent with slender roots branches ascending 3 or 4 inches long. Lower leaves elliptic ovate upper ones ovate glabrous 1½ to 1 inch long ⅜ inch wide amplexicaul with short sheaths. Pedicels axillary 1 to 3, together hairy ¼ inch long. Flowers yellow. Sepals (in fruit) oblong boat-shaped hairy ⅛ inch long. Capsule elliptic a little longer, splitting widely into 3 valves. Clarke Monogr. 207. Hook. fil, Fl. Brit. Ind. VI. *Dichaespermum aurantiacum*, Hassk. in herb. Zollinger.

Lankawi, Kwah in swamps (Curtis 2124). Distrib. India and Celebes.

I have only seen this in fruit. Curtis says the flowers are yellow. and Hasskarl's Mss. name seems to endorse this, but Clarke says "from dried specimens blue."

3. A. NUDIFLORUM, Br. Prodr. p. 271. Slender herb 4 to 15 inches tall shortly creeping. Leaves narrow linear or lanceolate acute ¾ to 3 inches long, $\frac{1}{16}$ to ½ inch wide light green sheath short ¼ inch bearded. Cymes terminal flowers small pink 5 to 10, branches 1 or 2 slender, pedicels slender. Stamens 2 fertile 2 to 4 sterile, filaments bearded. Capsule ovoid beaked, splitting in 3 valves ⅛ inch long. Seeds rounded compressed rugose black. Clarke Commel. and Cyrt. Beng. 21. Monogr. p. 210. Hook. fil Fl. Brit. Ind. VI. 378. Hassk. Pl. Jav. Rar. 95. *A. radicans* Don. Prodr. Fl. Nep. p. 45. Hassk. Pl. Junghuhu p. 145. *A. nudicaule* Kunth. Enum. IV. p. 67. *A. foliosum* Hassk. l.c. 144. *A. diversifolium* Hassk. l.c. 142. *A. Junghuhnianum* Miq. Fl. Ind. Bat. III. 358. Suppl. 609. *A. lancifolium* Griff. Notul. III. 236. *Commelina nudiflora* and Mant. 177 (not Sp. Pl.). Roxb. Fl. Ind. I. 173.

Singapore: Kranji (Ridley 3942), Tanglin, etc.; Johor: Bukit Muar (Feilding); Malacca: Pulau Besar (Maingay); Sungei Ujong: Bukit Kupaying, Bukit Sulu (Herb. Bot. Gard. Singapore); Pahang: Pekan (Ridley 1450); Perak: Thaiping (Wray); Penang: Gardens (Ridley 7041). Sepoy Lines (Curtis 1856). Kelantan, Kamposa (Ridley). Distribution Tropical Asia.

A common weed in dry spots. Native name "Rumput Lidah Lumbu," "Rumput Sarang Tupai," "Rumput Kurunit," "Rumput Tapah Burong."

4. A SINICUM, Lindl. Bot. Reg. t. 659. Roots tuberous. Basal leaves flaccid linear acute dilated at base 8 inches long by ¼ inch wide.

Flowering stems a foot or less hairy leaves lanceolate hairy 1 inch long, by ¼ inch wide, sheath ⅜ inch long hairy. Cymes terminal and axillary on peduncles 1 to 2 inches long. Bracts ovate large. Flowers crowded pale lavender. Stamens 2 fertile one with the filament densely bearded 3 sterile. Clarke Monogr. 212. Hook. fil. Fl. Brit. Ind. VI. 379. *A secundum* Wight. Ic. t. 2075. *Commelina sinica* Roem. and Schultes. Syst. I. Mantiss. i. Add. 376.

Johor : Pulau Tinggi (Feilding) ; Pahang : Pekan, Pulau Tawar (Ridley 1566). On sandy open heaths. Distrib. Africa, China, Malay Islands, Siam.

5. A. GIGANTEUM, Br. Prodr. 271. Roots fibrous. Stems erect about 2 feet tall with long internodes. Leaves narrow linear dilated at the base 15 inches long ⅛ inch wide. Stem leaves shorter hardly sheathing, all glabrous. Panicles short eventually lengthening and lax, few branched. Bracts ovate caducous. Flowers rather large blue. Sepals ovate. Petals blue. Stamens 3 bearded fertile, and 3 sterile ones. Capsule oblong ¼ inch long. Seeds compressed nearly smooth. Benth. Fl. Austr. 7 p. 88. Clarke Monogr. 212. Hook. fil. Fl. Brit. Ind. VI. 379. *A. longifolium* Hook. Exot. Fl. t. 204. *A. ensifolium* Wight Ic. 2074. Clarke Comm. and Cyrt. Beng. 22. *Commelina gigantea* Vahl. Enum. II. 177. *C. longifolia* Spreng. Syst. 4 post 25.

Johor : on rocks at Minyak Buku near Batu Pahat (Ridley) ; Kedah : Gunong Jerai (Ridley 5196). Distrib. India, Africa, China, Malay Islands, Australia.

6. A. VAGINATUM, Br. Prodr. 271. Roots swollen. Leaves fleshy linear 3 inches long ⅛ inch inch wide, sheaths of stem leaves ½ inch long or less. Uppermost ones reduced to sheaths ⅜ inch long. Stems slender 6 to 10 inches long. Flowers 1 or 2 from each sheath on slender pedicels ¼ inch long. Sepals lanceate acute green. Petals ovate bright blue. Stamens 2 large and 4 small, bearded. Style slender filiform. Capsule globose ⅛ inch long. Seeds rounded flattened rugose black. Wight. Ic. t. 2076. Clarke Comm. and Cyrt. Beng. t. 23. Monogr. 216. Hassk. Comm. Ind. 34. Hook. fil. Fl. Brit. Ind. VI. 381. *A. pauciflorum* Dalz. Hook. Journ. Bot. 1851, 136. Bombay Flora 253. *Commelina vaginata* Linn. Mantiss. 177.

Singapore : Teluk Kurau (Ridley 10,726) ; Johor : Tanjong Surat (Feilding) ; Pahang : Rumpin River (Ridley), Lankawi (Curtis). Distrib. India, Siam, Cochin-China, China. Sandy places among coconuts and open heaths.

7. A. CONSPICUUM, Kunth. Enum. IV. 69. Stems stout leafy erect or suberect a foot and a half long. Leaves lanceolate acuminate at both ends petiolate, 5 to 8 inches long 1¼ to 2¼ inch wide glabrous, sheaths 1½ inch long or less, strongly ribbed and slightly hairy. Panicle short 2 to 4 inches long with slender branches 1 inch long. Flowers

small numerous violet. Sepals ovate oblong boat-shaped purplish. Petals ovate obtuse $\frac{1}{8}$ inch long violet. Stamens all nude, filaments thickened in the middle, one anther bigger than the others capsule globose $\frac{1}{6}$ inch long, seeds solitary in each cell, elliptic grooved on one side transversely rugose. Clarke Monogr. 218. Hook. fil. Fl. Brit. Ind. VI. 382. *A. imberbe* Ridl. Trans. Linn. Soc. Bot. III. 389. *Commelina conspicua* Bl. Enum. Pl. Jav. I. p. 4. *Dictyospermum conspicuum* Hassk. Comm. Ind. p. 22.

Malacca: (Griffith), Bukit Sadanen (Derry 114); Pahang: Kwala Tembeling (Ridley 2382); Penang: Pulau Betong (Curtis 980, 1977). Distrib. Burmah, Siam, Java, Sumatra, Banda.

Native name "Poko Tampoh Kalin." Roots used medicinally.

4. Cyanotis, Don.

Branching slender herbs, often creeping. Leaves narrow, linear or oblong, amplexicaul sheathing. Flowers in dense cymes in a double row or irregularly crowded, rarely a few together, terminal. Bracts biseriate imbricating or narrow lanceolate. Sepals 3 nearly free or more or less connate, lanceolate. Petals 3 free at the base connate by the claws, limb rounded blue or pink. Stamens 6, filaments filiform covered with moniliform blue pink or white hairs. Ovary sessile, 3 celled, cells 2 ovuled. Style linear, stigma minute. Capsule papery 3 celled 3 valved loculicidal, placentas reflexed with the valves or rarely left as central column. Seeds 2 or 1 in each cell, cubic or pyramidal usually rugose.

Species about 30. Tropical Asia and Africa.

Cymes enclosed in biseriate imbricating bracts.
- Bracts very broad and large ... ... 1. *C. cristata.*
- Bracts small ... ... 2. *C. barbata.*

Cymes with narrow lanceolate bracts not imbricating ... ... 3. *C. capitata.*

1. C. cristata, R. and Sch. Syst. 7, p. 1150. Tall weak herb creeping at the base much branched hairy or glabrous. Leaves thin oblong lanceolate blunt 1 to 3 inches long, $\frac{1}{4}$ to $\frac{1}{2}$ inch wide base broad margins hairy, sheaths short edges ciliate $\frac{1}{6}$ long. Cymes terminal scorpioid $\frac{3}{4}$ to 1 inch long subtended by a long bract-leaf 1-1$\frac{1}{2}$ inch long. Bracts falcate ovate rounded edges ciliate in two rows. Flowers blue. Stamens bearded. Capsule oblong. Seeds angled on one face, rounded on the back with 4 foveoli on the inner face, often run into one. Hassk. Pl. Jav. Rar. p. 99. Pl. Junghuhn p. 153. Commel. Ind. 120. Wight Ic. 2082. Clarke Commel. and Cyrt. Beng. t. 36. Monogr. 247. Hook. fil. Fl. Brit. Ind. VI. 385. *C. imbricata* Kunth. Enum. 4 p. 103. *C. racemosa* Clarke Comm. and Cyrt. Beng. 38. *C. Hugelii*

Hassk. Comm. Ind. 128. *Commelina cristata* L. in Sp. Pl. p. 62. *Tradescantia cristata* Jacq. Hort. Vindob. 2 p. 64 t. 137. Bot. Mag. t. 1435. *T. imbricata* Roxb. Fl. Ind. 2. 120. *T. vaga* Zoll. Syst. Verz. p. 65.

Malacca: Pulau Besar (Ridley 1658); Penang: Gardens and in the Quarry (Curtis), Lankawi (Curtis 2364). Distrib. Tropical Africa and Islands, India and Malaya. In grassy spots not common.

2. C. BARBATA, Don. Prodr. 46. Prostrate creeping fleshy herb, stems 12 inches long hairy. Leaves lanceolate oblong or linear lanceolate covered with long scattered hairs 1 inch long $\frac{1}{4}$-$\frac{1}{2}$ inch wide. Peduncles 1 or 2 from the terminal leaf axil. Cymes $\frac{1}{2}$ to $\frac{3}{4}$ inch long. Bract long and narrow or short sometimes little longer than the floral bracts. Floral bracts broad rounded on the margin blunt hairy with long hairs. Sepals lanceolate hairy. Petals pale blue. Stamens bearded. Capsule short and broad hairy. Seeds oblong truncate grey, back with a longitudinal furrow. Clarke Commel. and Cyrt. Beng. t. 37, Monogr. 248, Hassk. Commel. Ind. 143. Hook. fil. Fl. Brit. Ind. VI. 385. *C. nodiflora* Clarke Journ. Linn. Soc. XI. 453. *C. nobilis* Hassk. l.c. 148. Clarke Commel. and Cyrt. Beng. 639. *C. glaberrima* Hassk. l.c. 156. *Tradescantia barbata* Spreng. Syst. Cur. Post 138. *T. radicans* Royle III. 403.

Singapore: Changi, Galang (Ridley 4418); Pahang: Pekan, Rumpin River; Penang, (Wallich 8988). Distrib. India, China.

A very variable plant apparently in India perhaps due to habitat. Here it occurs plentifully in sandy spots, a prostrate fleshy plant. I met with a form on the Rumpin River sand hills tufted erect and slender.

3. C. CAPITATA, Clarke, Monogr. 243. Procumbent rooting herb, stems slender hairy along one edge, internodes long one inch to 3 long. Leaves oblong lanceolate 1-2 inches long half an inch wide inaequilateral, edges hairy. Sheaths very short hairy. Heads small axillary and terminal few flowered $\frac{1}{2}$ inch long. Outer bracts lanceolate narrowed at the base hairy $\frac{1}{6}$-$\frac{1}{4}$ inch long, inner bracts similar but smaller. Flowers light blue. Sepals lanceolate keeled hairy. Capsule oblong obtuse hairy, seed oblong deeply reticulate pitted all over, grey. *Tradescantia capitata* Bl. Enum. Pl. Jav. 1 p. 6. Hassk. Commel. Ind. p. 63. *T. crassifolia* Hassk. Pl. Jungh. p. 152.

Selangor, edges of woods by the Kwala Lumpur Caves (Ridley). Rare. Distrib. Java, Cochin-China, Japan, New Guinea.

5. FLOSCOPA, Lour.

Erect or subscandent herbs, stems slender. Leaves lanceolate. Flowers small pink or blue, in terminal or axillary panicles of secund-flowered cymes. Sepals 3 oblong, free. Petals obovate. Stamens 6

perfect (or one imperfect) filaments glabrous. Ovary 2 celled. Cells one ovuled. Capsule globose or orbicular. Seeds hemispheric.

Species 12. 8 African, 3 American and one Asiatic.

1. Fl. scandens, Lour. Fl. Cochinch. 193. Creeping and ascending. Stems 6-12 inches or more, glabrous. Leaves elliptic lanceolate or linear, lanceolate acute ½-3 inches long, margins ciliate. Panicle large and dense 1 to 3 inches long terminal viscid hairy, branches erect, short, flowers small scattered on a pink rachis. Bracts leaf-like. Sepals ovate green viscid pubescent on the back. Petals a little larger blue, pink or white. Stamens 6 perfect. Capsule globose shorter than the sepals. Seeds hemispheric pink. Clarke Monogr. 265, Hook. fil. Fl. Brit. Ind. VI. 390. *F. paniculata* Hassk. Pl. Jungh. 157, and *F. Hamiltoni, undulata, petiolata* and *Meyeniana* Hassk. Commel. Ind. 166, 167. *Dithyrocarpus paniculatus* Kunth. Enum. IV. 70, Clarke Comm. and Cyrt. Beng. 34, *D. Meyenianus* and *rufus* Kunth. l.c. 7879. *D. petiolatus Rothii, and undulatus* Wight Ic. t. 2079, 2080. *Tradescantia paniculata* Roxb. Cor. Pl. II. t. 109. *Commelyna cymosa* and *densiflora* Bl. Enum. I. 4.

Singapore: Tanglin, etc., (Ridley); Johor: Tanjong Kupang (Ridley). Bukit Muar (Feilding); Malacca: Brisu Machap; Negri Sembilan: Seremban (Ridley 10041); Selangor: Klang; Perak: Padang Rengas, Thaiping; Penang Waterfall. Distrib. India, Malaya, China and Australia.

Common in muddy places by streams. Native names "Rumput Kumpai Tikus," "Rumput Tapak Eti."

6. Forrestia, Lesson.

Herbs usually stout creeping and ascending. Leaves broad lanceolate petioled, with tubular usually hairy sheaths. Cymes axillary short, often densely capitate rarely lax. Bracts ovate. Flowers small white. Sepals 3 boat-shaped. Petals lanceolate or obovate. Stamens 6, filaments contort, bearded at the top. Ovary 3 celled, cells 2 ovuled or sometimes 1 ovuled. Capsule oblong trigonous often pink. Seeds 1 or 2, cylindric or reniform.

Species 6. India, Malay, Formosa.

Stem slender ¼ inch through ... ... 1. *F. gracilis.*
Stems stout half an inch through.
Heads small compact subglabrous ... ... 2. *F. Griffithii.*
Heads lax much branched ... ... 3. *F. marginata.*
Heads dense softly hairy.
Leaves hairy on both surfaces ... ... 4. *F. mollis.*
Leaves glabrous above bullate ... ... 5. *F. monosperma.*
Heads densely covered with spiny hairs ... 6. *F. irritans.*

1. F. GRACILIS, Ridl. Journ. Roy. As Soc. S. Br. Vol. 48. p 37. Stem creeping then ascending for about 3 feet slender twiggy ¼ inch through dark green glabrous, internodes 2 inches long terete. Leaves lanceolate acuminate narrowed into a winged petiole dark green glabrous above, velvety beneath, margin with red appressed hairs, 8 inches long 2 inches wide, petiole and sheaths at mouth hairy. Heads small few flowered. Bracts ovate white with a green keel pubescent. Sepals oblong hooded white ciliate ⅙ inch long. Petals longer lanceolate acute white. Stamens 6, filaments contorted with a tuft of white hairs at the top. Anthers ovate deeply grooved white. Style filiform flexuous acuminate. Stigma minute ovary small covered with white hairs. Capsule oblong pink. *F. mollis* Clarke (in part not Hasskal) Monogr. 236.

Singapore: (Walker 155) Tanglin, Pulau Ubin (Ridley 4810); Johor: Tanjong Bunga (Ridley 6320); Pahang: Pulau Tijau, Pahang River (Ridley 2381, 2382); Malacca: Sungei Buluh (Ridley 10512); Selangor: Kwala Lumpur (Goodenough); Sungei Ujong: Gunong Berumbun (Herb. H. B. Singapore); Perak: Dindings Telok Sera (Ridley); Kedah: Gunong Jerai (Ridley).

Common in forests. Native name "Setawa Betina."

A decoction of the roots used by the wild tribes in cases of rheumatism. Endemic.

2. F. GRIFFITHII, Clarke, Monogr. 236. Stem stout ⅜ inch through 2 or 3 feet tall. Leaves lanceolate acuminate narrowed at the base into a petiole covered on both surfaces with hairs, thickest on the back 9 inches long 3 inches wide, petiole 2 inches long very hairy. Sheaths ½ to 2 inches long, mouth hairy. Heads small, ½ inch through sub-glabrous. Sepals oblong obtuse glabrous. Capsule oblong ⅜ inch long. Seeds solitary in each cell ⅛ inch long reniform rugose and grooved. Hook. fil. Fl. Brit. Ind. VI.

Johor: Gunong Pulai (Ridley) a very stout and hairy form. Malacca, (Maingay 1712 in part), Ayer Panas (Griffith 5485 part); Selangor: Jasin (Derry 499), Bukit Sadanen (Holmberg 856), Foot of Mount Ophir (Hullett 844); Negri Sembilan: Perhentian Tinggi (Ridley). In forests. Endemic.

3. F. MARGINATA, Hassk. Flora 1864, p. 630, Commel. Ind. 90. Stem very stout far creeping ½ inch through. Leaves elliptic lanceolate dull green acuminate narrowed at the base but hardly petiolate 12 to 14 inches long, 3 inches wide glabrous above except the edge, keel and base of lip on back hairy sheaths large margins hairy. Heads large much branched and lax, ¼ to 2 inches through. Bracts ovate hairy, lower ones purple. Flowers ⅜ inch long. Sepals obovate boat-shaped green, cartilaginous, one larger than the others. Petals a little longer ovule thin white. Stamens filiform twisted with a long tuft of hairs at the top. Anthers oblong grooved between the cells. Style long

spiral filiform. Ovary hairy. Capsule oblong ridged ¼ inch long. Seeds 2 in each cell semi-ovate punctate black ⅛ inch long. Clarke Monogr. 237. Hook. fil. Fl. Brit. Ind. VI. 383. *F. hispida*, Bot. Mag. t. 5425, (not of A. Rich) a varriety with purple backs to the leaves. *Campelia marginata* Bl. Enum. I. 7. *Amischolotypa marginata*, Hassk. in Flora 1863, 392. *Tradescantia* sp. Griff. Notulae III. 235.

Singapore: (Wallich 8977b) Bukit Timah (Ridley 6433); Johor: Gunong Panti, Tanjong Kopang, Pulau Tioman (Ridley); Malacca: Bukit Kedondong (Derry 602); Penang: Pulau Betong (Curtis 1948). Distrib. Siam, Java and Sumatra and Borneo.

On rocks in forest, scrambling about attached by its very long roots.

4. F. MOLLIS, Hassk. Flora. 1864, 68. Comm. Ind. 84. Stem stout. Leaves elliptic ovate acuminate base cuneate unequal, nearly a foot long and five inches wide covered with long appressed hairs above and short velvety hairs beneath, edges and midrib with long red hairs, petiole distinct 4 inches long sheath velvety hairy, mouth with longer red hairs 1½ inch long. Heads ¾ inch through covered with soft red hairs. Sepals linear oblong keeled tip red hairy. Petals linear short. Stamens filaments linear glabrous. Capsule subglobose trigonous ¼ inch long hairy. *F. mollis*, Clarke Monogr. 236 in part. *Campelia mollissima*, Bl. Enum. I. 7. *Amischolotypa mollissima* Hassk. Flora 1863, 392.

Perak: Larut Hills (Ridley 2950); Malacca: base of Mount Ophir (Ridley). Distrib. Malay Islands. Local in forests.

5. F. MONOSPERMA, Clarke in Bulletin Herb. Boissier VI. 1898, 359. Stems stout creeping ascending for about four feet, ½ inch through. Leaves oblong lanceolate dark shining green bullate above, purple beneath glabrous 15 inches long six inches wide, petiole broad channelled sheaths enlarged below covered with soft hairs 3 inches long. Heads on the lower part of the creeping stem 1 inch through. Sepals coriaceous oblong keeled hairy ½ inch long greenish, apex thickened dark pink. Petals thin white slightly longer lanceolate oblong obtuse. Stamens longer filaments filiform spiral with a tuft of long white hairs at the tip. Anthers oblong cordate. Capsule oblong shorter than the sepals. Seeds oblong 2 in each cell over ⅛ inch long flat punctate covered with a scarlet aril.

Selangor: Caves at Kwala Lumpur (Ridley 4599); Pahang: Tahan River (Ridley); Perak: Larut Hills, Waterloo (Curtis). Endemic. In rocky woods.

6. F. IRRITANS, Ridley Journ. Roy. As. Soc. S. Br. Vol. 41. p 38. Stem tall and stout ½ inch through. Leaves elliptic lanceolate with a broad flat petiole, acuminate 9 inches long 3 inches wide, hairy on both sur-faces, sheaths 1½ inch long, glabrous except the hispid edges.

Heads large and dense over an inch through densely covered with red spinous hairs. Sepals lanceolate covered with pungent hairs. Stamens 6 anthers oblong. Style filiform.

Selangor: Pahang track 15th mile (Ridley); Perak: Bujong Malacca (Ridley 9784); Sungei Ujong: Bukit Kupayang (Hort. Bot. Gard. Sing.)

This, of which I have not seen fruit, is remarkable for its dense globose heads of flowers covered with pungent red spines. Endemic.

7. Spatholirion, Ridl.

Stemless herbs with a very short rhizome. Leaves ovate cordate petioled fleshy. Scapes lateral shorter than the leaves, base nude. Buds at first enclosed in a spathe. Panicle short, female flowers remaining in the spathe at the base few. Males numerous terminal. Sepals 3 lanceolate ovate pubescent. Petals as long linear acute. Stamens 6, filaments slender bearded below. Anthers globose, no pistil. Female flowers larger similar to the males, but anthers sterile, pistil cylindric with a thickened terete style and a three lobed capitate stigma. Species 1. Endemic.

S. ornatum, Ridl. Journ. Bot. Aug. 1896, p. 329, pl. 360. Leaves 6 or 7, blade deep green often marked with white, back pubescent purple 4 inches long and wide petiole as long brown pubescent. Scape purple 6 inches long, branches $\frac{1}{4}$ inch. Spathe thick ovate mucronate $1\frac{1}{2}$ inch long. Flowers rosy $\frac{1}{4}$ inch across. Petals white. Stamens with a yellow beard at base. Pistil orange. Capsule oblong triquetrous (not ripe). Legeh (Machado). Rare.

Introduced to the Botanic Gardens alive by Mr Machado in 1896, where it regularly flowers, but has never produced seed.

XV. TRIURIDEAE.

Very small slender saprophytic herbs. Stem simple or branched with a slender creeping rhizome. Leaves ovate scale-like, scattered. Flowers unisexual minute pedicelled. Petals and sepals similar. Male flowers stamens 2-6 with very short or no filaments. Pistillodes 3 or more or 0. Female flowers with 0 to 6 staminodes and numerous crowded carpels 1 celled, 1 ovuled. Style terminal or lateral. Achenes globose or ovoid in a head, fleshy with a hard nucleus.

Two genera, one tropical Asiatic and one South American.

1. Sciaphila, Bl.

Perianth 3 to 8 lobed. Anthers sessile or subsessile at the base of the perianth. Species 21. Tropical Asia and South America.

Sepals and petals ovate. Pistillodes in male flowers numerous	1.	*S. affinis.*
Sepals and petals lanceolate. No pistillodes in male flowers	2.	*S. major.*

1. Sc. AFFINIS, Becc. Malesia III. 331, t. XXXIX. 14-18. Stem filiform often branched with ascending branches, 4-5 inches tall. Leaves ovate acuminate scale-like, base sheathing $\frac{1}{16}$ inch long. Flowers numerous scattered, pedicels slender nearly $\frac{1}{4}$ inch long spreading. Bracts lanceolate acute. Petals and sepals ovate acute male flowers stamens 3 with very short filaments, pistillodes numerous Femals carpels crowded in a globose head numerous smooth subglobose Staminodes 6 short.

Singapore: Bukit Timah, Seletar (Ridley); Malacca: Bukit Sadanen, Mount Ophir (var. major) (Ridley 3147); Selangor: 15th mile Pahang Track (Ridley); Pahang: Tahan River (Ridley); Perak: Gunong Keledang (Ridley). Gunong Bubu (Wray). Distrib. Borneo.

Common in woods among rotten leaves to an altitude of 4000 feet, but often difficult to see on account of the very delicate hairlike purple stems.

2. Sc. MAJOR, Becc. Malesia III. p. 332, t. XL. fig. 1-11. Simple or much branched slender stems 4 to 6 inches tall. Leaves scattered ovate obtuse. Flowers numerous scattered on very short pedicels pale lilac. Pedicels $\frac{1}{16}$ inch long. Bracts small oblong. Male flowers stellate. Sepals and petals lanceolate acuminate. Stamens 2 or 3. No pistillodes. Female flowers. Pistils glandular globose. Carpels subglobose.

Malacca: Bukit Bruang (Ridley 3535); Perak: Gunong Keledang, Kedah, Gunong Jerai (Ridley). Distrib. Borneo.

XVI. ALISMACEAE.

Aquatic or marsh plants. Leaves herbaceous radical ovate, lanceolate or linear, usually petioled. Inflorescence panicled or umbellate. Flowers white or pink regular uni-or bisexual. Sepals 3 herbaceous. Petals fugacious 3. Stamens 6 or more, hypogynous or perigynous. Anthers basifixed. Carpels 3-6 or more sessile or stalked on a flat or elevated receptacle. Style 1 sub-terminal or basal. Stigma simple. Ovules 1 or more. Fruit small achenes or follicles with small exalbuminous seeds.

Achenes long beaked.	1.	*Ranalisma.*
Achenes rounded very numerous.	2.	*Sagittaria.*

1. RANALISMA, Stapf.

A low herb with slender stolons and fine roots. Leaves and peduncles from the base. Leaves ovate or ovate oblong blunt thin with 9 pairs of conspicuous nerves and 2 intra-marginal ones petiole long erect. Inflorescence cymose of 2-3 flowers, or one flower only. Flowers hermaphrodite. Sepals 3 herbaceous persistent at length deflexed. Petals larger white. Torus convex lengthening in fruit. Stamens 9 in one whorl hypogynous. Ovaries crowded, style beaked. Carpels one-seeded compressed winged tipped with the persistent style, pericarp thin. Seed erect curved. Monotypic.

R. ROSTRATA, Stapf. Ic. Pl. 2652. Petioles very slender 4-7 inches long, leaf blade thin base rounded 1-1½ inch long, ¾-1 inch wide. Scapes shorter 3 to 5 inches long slender. Flowers small white, pedicels ¼-1 inch long. Bracts oblong connate at base. Fruit ½ inch through.

Selangor, in black mud in an open space in dense forest, at the Caves, Kwala Lumpur. Rare (Ridley 8464). Endemic.

2. SAGITTARIA, Linn.

Erect aquatic plants. Leaves long petioled elliptic ovate cordate or sagittate. Flowers panicled or spicate whorled unisexual or bisexual, white. Sepals 3 herbaceous. Petals 3 deciduous. Stamens 6 or more, filaments filiform. Carpels numerous crowded on a large receptacle globose or oblong. Style ventral or apical. Ovules solitary basilar. Achenes in a globose or oblong head, flat, crested or winged. Species about 15, whole world.

S. GUAYANENSIS, Humb. Bonpl. Kunth. Nov. Gen. and Sp. 1. 250. Leaves orbicular or ovate cordate obtuse floating 1½-2 inches long, lobes broad acute or obtuse petiole long and slender, 6-8 inches long. Scapes 3 to 8 inches long, panicle branches few and short. Bracts ovate ¼ inch long. Pedicels ½ inch long. Flowers ¼-⅔ inch across. Sepals oblong lanceolate or ovate. Petals white cuneate longer. Stamens 9 to 12. Carpels very numerous in a globose head ½ inch through flat orbicular dentate. Kunth. Enum. III. 161. Hook. Fil. Fl. Brit. Ind. VI. 561. *S. cordifolia*, Roxb. Fl. Ind. III. 647. *S. lappula* Don. Prodr. 22. *Lophiocarpus Guryanensis* Micheli. A. De C. Monogr. Phan. III. 62.

Pahang: Pekan, Pulau Tawar (Ridley); Malacca: Merlimau (Derry 240); Province Wellesley: Permatang Bertam (Ridley 961); Penang: Pulau Betong (Curtis 1944). Distrib. India, China, Australia, Malay Islands.

In rice fields. Native name "Keladi Ayer," "K'lipoh Padang."

S. SAGITTIFOLIA, L. is sometimes cultivated by the Chinese to feed pigs on. It never seems to flower here.

XVII. NAIADACEAE.

Aquatic submerged fresh water or marine herbs with slender stems and linear leaves bases sheathing. Flowers uni- or bi-sexual very small green with no perianth or with a small hyaline one. Stamens 1 or 2. Carpels 2 or more.

Naias, L.

Fresh water or brackish herbs. Stems slender branched. Leaves opposite alternate or whorled linear entire or toothed. Flowers axillary unisexual minute. Male flower with a tubular or inflated entire or 4 toothed utricle and a inner one. Stamen 1, adnate to the inner perianth tube 1-4 celled. Female flower perianth none or thin and adnate to the carpel. Carpel 1 sessile 1 ovuled. Stigmas 2-4. Ovules basilar erect. Achene oblong, testa thin. Species about 10 whole world.

Male and female flowers without a spathe 1. *N. graminea.*
Male flowers in a spathe.
Anther unilocular.
Leaf sheaths truncate rounded ... ... 2. *N. minor.*
Anther 4 locular.
Leaf sheaths edges ones lapping large ... 3. *N. Kingii.*

1. N. GRAMINEA, Delile. Descr. Egypt Hist. Nat. II. 282. t. 50. fig. 3. Stems slender 8-9 inches long, but longer in deep water, much branched. Leaves narrowly linear crowded ternate acuminate toothed dark green ½ inch long or more, sheaths truncate toothed, basal auricles toothed, flowers solitary or few together. Males shortly pedicelled nude. Perianth bilobed above. Female flowers 2 to 4 together. Ovary narrow elliptic. Style distinct. Stigmas 2 short. Achene elliptic beaked marked with longitudinal areolae. Kunth. Enum. III. 115. Hook. fil. Fl. Brit. Ind. VI. 569. Rendle. Trans. Linn. Soc. Vol. V. p. 424, pl. XLII. figs. 192-201. *N. alagnensis* Pollini. Fl. Veron. III 49. *N. seminuda* Griff. Notul. III. 184, Ic. Pl. As. t. 251, fig. 2, t. 253, 254. *N. serristipula* Maxim. Bull. Acad. St. Petersb. XII. 72.

Pahang, Pekan (Ridley). Province Wellesley, Permatang Bertam (Ridley).

var. *angustifolia* Rendl. l.c. p. 427, Pl. XLII. 202.

A weak plant with narrower leaves the tips almost setaceous, marginal teeth more conspicuous, fruit smaller.

Singapore, Garden Lake and ditches often in enormous masses (Ridley 8946, 10316). Distribution of type Europe, Africa, Persia, India, Malay Archipelago, Japan and Australia. Variety distribution Borneo.

2. N. MINOR, All. Fl. Pedem. II. 221. Stems much branched internodes long or short. Leaves linear narrowed upwards falcately recurved, base broad, toothed half an inch or more long, sheaths rounded truncate with prominent teeth, rarely more or less auriculate. Flowers solitary, males sessile, spathe ellipsoid ending in a shortly cylindric toothed neck. Perianth 2 lipped. Female flower nude ovary ellipsoid. Style long cylindric. Stigmas 2. Achene obliquely linear oblong, testa hard brown marked with scalariform rows of pits. Kunth. Enum. III. 113, Hook. fil. Fl. Brit. Ind. VI. 569. Rendle Trans. Linn. Soc. V. p. 410, Pl. XLI. 105-115. *N. dichotoma*, Roxb. Hort. Beng. 71. Fl. Brit. Ind. III. 749. *N. ternata*, Rox. Griff. Not. III. 183. Ic. Pl. As. t. 252. *Caulinia fragilis*, Welld. Mem. Acad. Roy. Soc. Berl. 1728, t. 1, f. 2.

Malacca, (Griffith 5609/5, 5609/7).

3. N. KINGII, Rendle. Trans. Linn. Soc. V. 415, Pl. XLI. figs. 126-131, p. 442. Branches long straggling ending in a dense bushy growth, internodes $1\frac{1}{4}$-$1\frac{1}{2}$ inch long. Leaves over an inch long, linear narrowed, apex 1 or 2 toothed with numerous ascending teeth 16-19 on each edge base triangular apex tipped with a dark brown spine. Sheath large and broad with overlapping edges, upper edge truncate with broadly rounded shoulders bearing about 10 teeth. Flowers solitary, male and female on the same shoot, male sessile spathe ellipsoidal ending in a cylindric neck with numerous spines at the mouth. Perianth fitting closely to the ellipsoidal 4 locular anther above ending in two thickened lips. Achene with 30 rows of small hexagonal pits.

Singapore, (Schlesich. Botan. Tauschv. No. 528). Ditches, Tanglin (Ridley). Distribution, Andamans and Tonkin.

XVIII. FLAGELLARIAE.

Climbing shrubs or terrestrial or semiaquatic herbs. Leaves many nerved petiole sheathing. Flowers small in terminal panicles unisexual or bisexual. Sepals 3 imbricate. Petals a little longer. Stamens 6 hypogynous, filaments free. Anthers basifixed erect. Ovary superior 3 celled. Styles short or long, stigmas 3.

Fruit a drupe or 2-3 seeded berry.

Seeds albuminous.

Flowers, Bisexual.

Stem scandent woody, climbing by cirrhose leaves	1. *Flagellaria.*
Stems erect reed-like hollow. Plants unisexual	2. *Joinvillea.*
Stems prostrate, leaves large succulent ...	3. *Susum.*

1. Flagellaria, L.

Stem woody climbing by the cirrhose leaf tips. Leaves sessile, narrow. Panicles terminal. Flowers bisexual small. Sepals 3. Petals 3 little longer. Stamens 6. Styles 3. Seed single or 2.

Species 2, one Polynesian, the other tropics of the Old World.

F. INDICA, L. Sp. Pl. 333. Stems ¼ inch through or less, climbing to a great height. Leaves lanceolate sheathing at the base, 6 to 10 inches long ⅛ to ½ inch wide. Panicles 2 to 3 inches long or more much branched. Flowers small clustered white sessile. Sepals orbicular. Petals oblong blunt a little longer. Stamens 6 filaments filiform. Anthers long narrow. Styles 3 very thick long. Drupe pink ¼ inch through globose, pulp thin. Seed 1, testa black. Kunth. Enum. III. 370. Roxb. Fl. Ind. II. 154. Miq. Fl. Ind. Bat. III. 249, Redoute Lil. V. 257. Hook. fil. Fl. Brit. Ind. VI. 391.

Singapore: Kranji (Ridley 1645) Bajau (3589a); Johor: Tana Merah, (Ridley); Malacca: Sungei Rambai (Derry 308). Sungei Udang (Goodenough 1816); Pahang: Pekan (Ridley).

var. *minor*. Stems very slender, short, leaves 3-4 inches long ⅛ broad. Panicle 1 to 3 inches. *F. minor* Bl. Roem. and Schultes Syst. VI. 1493, Miq. Fl. Ind. Bat. III. 249, Suppl. 598.

Singapore: (Wallich 5199, F. angustifolia) Changi (Ridley 6025); Malacca: Bukit Sabukor (Derry 275); Perak: (Wray 3157). Distrib. Tropical Africa and Asia and Australia.

Very common especially near the sea, seldom far inland. "Rotan Tikus," "Rotan Binni." The stems are used in basket work.

2. Joinvillea, Gaud.

Reedlike erect perennial plants, with hollow stems. Leaves plicate stiff lanceolate or linear acuminate. Panicle terminal lax branches sinuate pubescent. Flowers scattered small. Sepals 3 chartaceous. Petals 3 about as long. Stamens 6 or one abortive hypogynous free, filaments slender. Anthers oblong or linear, cells parallel. Ovary superior conic, style stout simple. Stigmas 3 linear. Berry very small succulent, pericarp eventually crustaceous, 2-3 seeded.

Species 4. Hawaii, New Caledonia and Malay Islands to the Peninsula.

(Note.—The pistil is described (Gen. Plant III. p. 861) as with "styli 3 a basi stigmatosi." In the flower of the Malayan species the pistil consists of apparently a conical ovary with a distinct stout style bearing three stigmas at the top, the style being much longer than the ovary. As the fruit ripens however the style disappears so that the fruit appears to be a conic body with the three stigmas persisting, and sessile on the top of the fruit. When quite ripe the fruit is globose

and smooth, the stigmas having fallen off so that the three styles described by Bentham and Hooker are rather stigmas, while the true simple style is gradually absorbed into the fruit).

1. J. MALAYANA, Ridl. Journ. Roy. As. Soc. S. Br. Vol. 44, p. 199. Tufted plant with stems 6-8 feet tall, $\frac{1}{4}$ inch through woody hollow, and leafy. Leaves very stiff coriaceous plicate linear long acuminate narrowed at the base bright green glabrous 18 to 24 inches long 2 inches wide, many nerved. Sheaths large smooth. Panicle large spreading 8 inches long, with stout hairy branches. Flowers sessile or nearly so $\frac{1}{8}$ inch long. Sepals 3 ovate keeled subacute with a small point, ciliate at the tip. Petals as long 3, oblong truncate, apex and edges ciliate. Stamens 5, with one abortive. Anthers linear oblong base emarginate dorsifixed, filaments about $\frac{1}{2}$ as long. Ovary conic rugose. Style stout. Stigmas 3 shorter plumose. Fruit very small globose red 3 seeded. Seeds enclosed in a pulp, globose, testa thin hard black. Albumen farinaceous white.

Perak: Thaiping Hills, by the cottage abundant in dry soil at 4500 feet (Ridley). Gunong Batu Putih 4500 feet (Wray) in Herb. Kew (fide Rendle sub nom *J. elegans*); Selangor: Semangkok Pass (Ridley). Distrib. Borneo on Matang (Coll. Bartlett).

This seems very distinct from the other described species of which descriptions and specimens have been kindly supplied me by Mr. Rendle but most nearly approaches *J. ascendens* Gaud. of Hawaii.

3. SUSUM, Bl.

Unisexual aquatic or terrestrial plants with creeping rhizome. Leaves fleshy crowded ensiform or lanceolate. Panicle terminal patent, branches in half whorls bracteate. Flowers small sessile green or yellow. Sepals and petals subequal orbicular or ovate. Stamens 5 to 6 filaments filiform from a broader base. Pistillode small. Female flowers similar. Pistil ovoid or lobed, with 3 flat stigmas. Ovary 3 celled. Fruit fleshy, one seeded.

Species 2 or 3, Ceylon and Malaya.

(This genus has been classed under *Xerotideae*, *Juncaceae* and *Flagellarieae*, but is generally referred now to the latter order. It does not seem to possess any very close relationship with *Flagellarieae* however, and perhaps later discoveries may make it a type of a distinct order).

Aquatic plant, leaves ensiform ... ... 1. *S. anthelminticum.*
Forest plant, leaves lanceolate petiolate ... 2. *S. malayanum.*

1. S. ANTHELMINTICUM, Bl. Schultes. f. Syst. VII. 1493. A very large aquatic plant, emitting long floating stolons. Stem an inch through creeping. Leaves erect 6 feet or more tall 6 inches across

sword-shaped acuminate bright green glabrous not petiole, with a broad rib at the base narrowed upwards. Panicle 2 feet long, spreading, 8 inches or more across much branched branches in half whorls glabrous. Bracts lanceolate 8 inches long. Flowers small greenish yellow sessile males (not seen) "filaments short dilated below, anthers oblong (Trimen)." Female sepals and petals rounded orbicular ovate, nearly equal. Stigmas 3 short recurved ovary 3 celled "Berry fusiform usually 1 seeded" (Trimen). Kunth. Enum. III. 371. Miq. Fl. Ind. Bat. III. 247. Hook. fil. Fl. Brit. Ind. VI. 391. Trim. Fl. Ceyl IV. p. 317.

Perak, Kinta Valley, Lahat (Ridley).

In ponds, and ditches, abundant but local. Native name "Bakung." Distrib; Ceylon : Java, Sumatra.

A very distinct plant from the other species when alive, and impossible to confuse with it. It is strictly aquatic (whereas the other species inhabits dense forest only), and forms great floating masses in the Siak River, Sumatra, almost blocking it. Though described as having pubescence on the base of the leaves, and (Fl. Brit. Ind.) also on the panicle, I have seen no trace of any pubescence on it anywhere.

2. S. MALAYANUM, Hook. fil. Fl. Brit. Ind. VI. 361. Stems short often only a few inches long, to 3-4 feet long. Leaves glabrous above dark green, lighter and slightly cobwebby beneath, lamina lanceolate acuminate 12-50 inches long 2-4 inches wide petiole channelled 3 or 4 inches to a foot long. Panicles 1-2 feet long lax, branches in half whorls 2-6 inches long tomentose with leafy bracts at the bases of the lower whorls, peduncle and branches cobwebby. Flowers sessile scattered. Male panicles with very slender branches. Male flowers of 2 or 3 small orbicular sepals. Petals oblong lanceolate. Stamens 5 or 6, bases linear above filiform. Pistillode small 5 or 6 lobed. Female panicles stouter. Female flowers sepals orbicular imbricate gibbous at the base. Petals about twice as long, ovary ovoid, stigmas 3 short. Fruit pink turning black globose or oblique ¼ inch through crowned with the three sessile stigmas, pericarp fleshy. Seed 1 flattened rounded on one side.

Veratrum ? malayanum, Jack. Mal. Misc. Hook. Bot. Misc. II. 74. *Veratronia malayana*, Miq. Fl. Ind. Bat. III. *Hanguana kassintu*, Bl. Enum. I. p. 15, Miq. l.c. 248 ?

Singapore: Bukit Timah, Seletar (Ridley 9531, 170); Johor: Kwala Sedili (Kelsall); Malacca: Batu Tiga (Ridley 984); Negri Sembilan : Gunong Talau; Bukit Sulu (Herb. B. S.); Perak : Gunong Batu Putih (Wray 1051), Gunong Bubu (Wray 3900); Penang, (Jack).

Native names "Bangkong," "Bangkong Rimbah," "Labak Jantan."

There seems to have been a good deal of confusion about this plant, and the descriptions given in various works are hardly adequate. I think it is pretty clear what Jack meant by this *Veratrum malayanum* but he states that it has three seeds. I have never seen more than one developed. Being an unisexual plant it may often be found with apparently ripe black fruit no larger than pepper corns, but examination of the seeds shows that they are abortive. I have however occasionally met with plants exactly similar habit, with fruit still unripe as big as cherries. These contain traces of three cells, one of which contains a seed rounded on the outer surface and flattened on the inner face. I presume these are fertilized fruits. The plant inhabits dense forest in damp spots, quite unlike *S. anthelminticum* which is aquatic with a long stem and long floating shoots. It varies a good deal in size, sometimes flowering in a quite stemless state, with short leaves and a short panicle, sometimes possessing a stem a foot or so long.

XIX. PALMAE.

Shrubs or trees erect or climbing occasionally prostrate, naked or armed with thorns. Leaves alternate petiole sheathing limb pinnatisect, or palmate, sometimes entire or bi-pinnate. Inflorescence panicled or spicate axillary or subterminal enclosed at first in one or more sheathing bracts, (spathes). Flowers small rarely large, white green or yellow, rarely pink unisexual or bisexual, usually quite sessile and sunk in pits in the rachis. Perianth inferior. Sepals 3 short. Petals 3 longer. Stamens 3 to 6 or more, filaments free filiform or connate. Anthers versatile. Ovary 1 to 3 celled, or of 3 1-celled carpels. Ovules 1 to 3 in each cell, anatropous. Stigmas 3, usually sessile. Fruit a drupe or hard nut; pericarp fleshy fibrous or hard, or crustaceous, smooth or rough, or covered with rhomboidal scales imbricating downwards. Seed erect or laterally attached, raphe usually branching all over the testa. Albumen horny or bony equable or ruminate. Embryo very small in a cavity of the albumen.

Species over a thousand chiefly tropical; most abundant in South America and the Malayan region.

1. ARECEAE, leaves pinnatisect, or rarely entire. Inflorescence spicate or panicled, appearing from below upwards. Flowers unisexual or bisexual, on the same inflorescence. Fruit drupaceous.

Male flowers asymmetric minute on the tips of the branches.

Females larger at the base ... ... 1. *Areca.*

Male flowers 2 on either side of erch female asymmetric unarmed albumen ruminate.

Sepals and petals orbicular ... ... 2. *Pinanga.*

Sepals lanceolate as long as petals ... 3. *Nenga.*

Unarmed, albumen equable ... ... 4. *Orania.*
Armed, albumen ruminate ... ... 5. *Oncosperma.*
Male flowers symmetrical.
Flowers in pairs 1 male 1 female ... ... 6. *Ptychoraphis*
Flowers in threes 2 males and 1 female.
Spathes large caducous ... ... 7. *Cyrtostachys.*
Spathes sheathing persistent ... ... 8. *Iguanura.*

2. CARYOTIDAE. inflorescence panicled appearing at the top of the stem when adult and then downwards alternately unisexual. Spathes short persistent.
Very large palms. Leaflets linear ... 9. *Arenga.*
Dwarf palms. Leaflets cuneate ... ... 10. *Didymosperma.*
Tall palms. Leaves bi-pinnate with cuneate leaflets ... ... 11. *Caryota.*

3. NIPEAE. Stem stout creeping. Leaves pinnatisect leaflets narrow. Inflorescence with several bracts bisexual. Male flowers in dense catkins, female in a globose head. Fruit a large syncarp of obvoid 1 seeded carpels ... 12. *Nipa.*

4. PHOENICEAE. Leaves stiff pinnatisect, leaflets narrow folded in at base. Inflorescence unisexual branches fascicled.
Spathe large solitary deciduous. Seed oblong ventrally grooved ... ... 13. *Phoenix.*

5. CORYPHEAE. Leaves cuneate or orbicular, entire or cut into linear or cuneate lobes. Inflorescence terminal or axillary. Spathes numerous tubular persistent. Flowers bisexual ovary 3 lobed or 3 carpellary or entire.
Leaves orbicular deeply cut into cuneate truncate segments, rarely entire ... ... 14. *Licuala.*
Leaves orbicular, segments acuminate.
Fruit small, albumen equable ... ... 15. *Livistona.*
Fruit large albumen ruminate ... ... 16. *Pholidocarpus.*
Leaves obcuneate entire very large ... ... 17. *Teysmannia.*

6. LEPIDOCARYEAE. Leaves pinnatisect, leaflets numerous narrow linear, lanceolate or broadly cuneate. Inflorescence axillary or terminal. Spathes cymbiform caducous, or tubular persistent, numerous. Flowers unisexual

or bisexual. Fruit covered with imbricating scales.

Tufted palms not climbing.

Flowers very small in dense spikes ... 18. *Zalacca.*

Flowers large in a tall erect panicle ... 19. *Eugeissona.*

Climbing palms. Polycarpic with axillary inflorescence.

Spathes cymbiform at first enclosing the inflorescence then deciduous.

Spathes several ... ... 20. *Daemonorops.*

Spathe one ... ... 21. *Ceratolobus.*

Spathes tubular not covering the inflorescence persistent.

Inflorescence long unisexual.

Scales of fruit large in spirals ... ... 22. *Calamus.*

Scales of fruit minute very numerous ... 23. *Plectocomiopsis.*

Monocarpic palms. Inflorescence terminal stems dying after flowering.

Leaflets cuneate erose, spikes dense bracts 1 flowered ... ... 24. *Korthalsia.*

Leaflets lanceolate acute.

Spikes lax, bracts ovate imbricate many flowered ... ... 25. *Plectocomia.*

7. BORASSINEAE. Tall erect palms. Leaves fanshaped, spadices interfoliar spathes numerous sheathing. Flowers unisexual males minute, sunk in cavities of the thick spadix, branches females large sessile, surrounded by large coriaceous round bracts. ... ... 26. *Borassus.*

1. ARECEAE.

1. ARECA, L.

Large or small palms with solitary or several stems, erect ringed. Leaves pinnate. Panicles infrafoliar branches numerous slender, terminal portions male, with a few female flowers at the base of each branch. Male flowers asymmetric very small. Sepals small ovate. Petals lanceolate often oblique ribbed. Stamens 3 or 6. Anthers basifixed. Female flowers much larger. Sepals orbicular ovate. Petals a little longer. Stigmas 3 small. Ovule 1, basal erect. Fruit ovoid oblong or fusiform. Stigmas terminal. Seed ovoid base truncate. Albumen ruminate.

Species 10, Indo-Malayan and Australian.

Stem stout 2 inches through, seed ovoid... 1. *A. pumila.*
Stem $\frac{1}{2}$ inch through ... ... 2. *A. montana.*
Stem $\frac{1}{4}$ inch through, seed fusiform ... 3. *A. furcata.*
Stem slender $\frac{1}{2}$ inch through.

1. ARECA PUMILA, Bl. Rumph. II. p. 71 t. 99. 102 (not Mart). Stems solitary 10-15 feet tall, 2 inches through light green. Leaves about 6 feet long light green leaflets broad 18 inches long and 3 inches wide acuminate. Spadix stout 9 inches long, branches 4 inches long about 13. Male spikes 6 inches long slender. Flowers $\frac{1}{8}$ inch long. Sepals very small ovate. Petals lanceolate acute equal 7 ribbed. Stamens 3. Female flowers sepals ovate obtuse smooth $\frac{3}{8}$ inch long. Petals shorter ovate, green. Pistil conic. Fruit $1\frac{1}{2}$ inch long white tipped red, $\frac{3}{4}$ inch through apex beaked. Seed ovoid with a broad base, $\frac{5}{8}$ inch long. *A. triandra* var. *pumila*, Miq. Fl. Nederl. Ind. III. 11.

Hill woods. Selangor: Ginting Bidai (Ridley); Perak: Larut Hills (Ridley 11429). (Wray 949); Penang: Waterfall (Curtis). Lankawi Kwah (Ridley). Distrib. Java.

This is doubtless the plant referred to *A. triandra* Roxb. in the Fl. Brit. Ind. VI. p. 406. It differs in its broader leaflets, solitary stouter stem, and seed shaped like that of a betel nut. Blume figures the fruit as bright red. I have only seen it of a creamy white tipped red at each end.

2. A. MONTANA, n.sp. Stem 15 feet tall $\frac{1}{2}$ inch through distinctly ringed, rings broad half an inch apart. Leaves 18 inches long 2 foot wide, sheath six inches long, mouth oblique petiole recurved 3 or 4 inches long, leaflets numerous over 20, linear acuminate 1 foot long $\frac{1}{2}$-1 inch wide. Terminal one deeply bifid lobes $1\frac{1}{2}$ inch wide. Spadix $4\frac{1}{2}$ inches long, base $\frac{1}{2}$ inch wide branches few 3 inches long slender sminous. Male flowers. Female flowers $\frac{1}{4}$ inch long ovate curved. Petals ovate obtuse.

Selangor: Semangkok Pass, at 3000 feet alt (Burn-Murdoch).

3. A. FURCATA, Becc. Malesia I. 23. Stems light coloured when dry $\frac{1}{4}$ inch through, internodes an inch long. Leaves cuneate bilobed or irregularly bipinnate, pinnae broad acuminate about 7 inches long, petiole 1 to 3 inches long sheaths broadly strongly ribbed. Spathes not seen. Spadices usually erect 2 inches long with 5 branches, slender zig-zag. Flowers very small scattered in 2 rows. Males $\frac{1}{8}$ inch long. Calyx short rounded cupular. Petals short ovoid, longer. Stamens 11-12, filaments short anthers narrow linear. Females larger. Calyx large. Sepals falcate ovate, petals similar but smaller. Fruiting calyx enlarged. Drupe fusiform $\frac{3}{4}$ inch long, ribbed when dry, terminated by a ring-shaped disc, styles short triangular.

Johore, Gunong Janeng (Lake and Kelsall). "Pinang Kaki Pelandok."

This elegant little palm also occurs in Sarawak on Matang (Hullett) and in British North Borneo at Bongaya.

A. Catechu, L. Sp. Pl. 1189. The Betel nut palm "Pinang" is largely cultivated but not native. Its original habitat appears to be unknown. It does not seem to establish itself here, though it remains in old cultivations for a long time. The plant is mentioned as cultivated in Malacca by Garcia da Orta (Hist. Arom. 99. A.D. 1593) but as in small quantities only, the supply being insufficient for the natives. It is also mentioned in a Chinese work dated B.C. 140-86 under the name of Pin Lang evidently a perversion of Pinang.

2. PINANGA, Bl.

Small to moderately tall palms, usually several stemmed, unarmed. Leaves pinnatisect more rarely entire. Spadix simple or compound, emerging below the leaves. Flowers small, two males with one female between. Male flowers symmetric. Stamens 6 or more. Female flowers smaller ovoid or globose, sepals and petals orbicular. Ovule basilar erect. Drupe ovoid or elliptic, pericarp pulpy, fibrous. Albumen ruminate.

Species about 50. Tropical Asia.

1. SPIRANTHEAE, Flowers spirally arranged on a compound spadix.

Leaflets linear acuminate	1. *P. Scortechinii.*
Leaflets few trapezoid	2. *P. canina.*
Leaflets falcate sigmoid	3. *P. polymorpha.*

2. ORTHOSTICHANTHEAE. Flowers distichously arranged on the spadix.

Dwarf palms with slender stems. Leaf cuneate entire or rarely with a few unequal leaflets.

Leaf half as broad as long.

Rarely lobed. Stems several slender ...	4. *P. disticha.*
Usually lobed. Stems solitary slender ...	5. *P. limosa.*
Lobed or entire almost stemless	6. *P. acaulis.*

Leaf more than twice as long as broad.

Spadix stout simple	7. *P. subruminata.*
Spadix very slender simple	8. *P. subintegra.*
Leaf pinnate leaflets about 30 linear ...	9. *P. calamifrons.*

Tall palms 5 to 15 feet or more stem stout. Leaves pinnate leaflets linear acuminate.

Spadix small simple rarely 2 branched ... 10. *P. paradoxa.*
Spadices stout branched.
Branches 6-8 erect ... ... 11. *P. pectinata.*
Branches 2-6 deflexed short ... ... 12. *P. perakensis.*
Branches 12 inches long deflexed very stout.
Leaf large, leaflets numerous ... ... 13. *P. malaiana.*
Branches 3 to 4 short deflexed.
Leaflets 8 ... ... 14. *P. riparia.*
Leaflets sigmoid.
Spadix erect ... ... 15. *P. patula.*
Spadix deflexed ... ... 16. *P. singaporensis.*

1. SPIRANTHEAE.

1. P. SCORTECHINII, Becc. Males. I. 170. Stems 5 to 15 feet tall, $1\frac{1}{2}$ inch through green, internodes 4 inches long. Leaves 7 feet long, petiole $\frac{1}{3}$ of the length, leaflets 20 pairs lower ones linear acuminate, upper ones broader 3 toothed, teeth broad, terminal leaflet acuminate broad deeply bifid tips with broad teeth, rachis brown scurfy, back of leaf grey. Spathe papery 3 inches long. Compound spike ascending 6 inches long, with 4-8 stout branches. Flowers spirally arranged. Males $\frac{1}{6}$ inch long. Calyx short. Petals ovate acute. Stamens shorter. Anthers linear sagittate. Females, sepals orbicular. Petals a little longer. Drupe elliptic blunt $\frac{1}{2}$ inch long. Seed deeply ruminate. Hook. fil. Fl. Brit. Ind. VI. 408. *P. robusta* Becc. and Hook. fil. l.c.c.

Selangor: Bukit Kutu (Ridley 7890); Sungei Ujong: Bukit Temiang (Cantley's Coll); Pahang: Kwala Tembeling (Ridley); Perak: Larut Hills (Curtis 2080); Bujong Malacca (Ridley 9800); Penang: Penara Bukit (Ridley).

Hill woods usually from 2 to 4000 feet alt., seldom lower. Malay name "Bayas betina."

2. P. CANINA, Becc. Mal. III. 135? Stem slender as thick as a pencil internodes 1 inch long. Leaf-sheaths ribbed 2 inches long ligule bifid lobes lanceolate acute, petiole 4 inches long angled, leaflets 1 pair trapezoid acuminate 4 inches long to the tip $1\frac{1}{2}$ inch wide, 4 nerved terminal pair very broad 6 inches long 3 inches wide, 7 nerved rounded truncate widely spreading. Spathes thin papery 1 inch long. Spikes 2 inches long, 4 on a short peduncle. Flowers spiral, about 20 on a spike, rachis angled scurfy.

Province Wellesley, Ara Kudah (Ridley 7027.) Distrib. Borneo.

I believe this is what Beccari intends by his *P. canina.*

3. P. POLYMORPHA, Becc. Malesia III. 173. Becc. and Hook. fil. Fl. Brit. India VI. 407 (in part). Stems solitary slender $\frac{1}{4}$ to $\frac{1}{3}$ inch

through, internodes 2½-4 inches long. Leaf 8-12 inches long, variable pinnate rarely subentire, terminal segments confluent truncate and acutely toothed at the tip, lateral ones 1-6 one or many ribbed falcate or falcate sigmoid acuminate, ligule long breaking up into fibres. Spathe elliptic acute. Spadix deflexed simple or tripartite 3-5 inches long. Male flowers pyramidal trigonous acuminate. Calyx very short with 3 acute teeth. Stamens 12 filaments short. Female flowers in 3 or 4 rows globose. Petals and sepals similar, edges ciliate. Fruit black elliptic or oblong ¾ inch long by ⅓-½ inch through. Seed ovate, albumen densely ruminate.

Perak: (Scortechini 345a), Thaiping Hills (Ridley), Gunong Batu Putih (Wray 947); Selangor: Ginting Bidai (Ridley 7888), Semangkok Pass (Ridley of 12,122) Type. The plants added to this species in the Flora British India l.c. viz. Singapore (Lobb) and (King's Collector 8072) are both *Pinanga disticha* Bl. but I think the plants collected by myself and here noted belong to this species.

2. ORTHOSTICHANTHEAE.

4. P. DISTICHA, Bl. Rumphia II. p. 77. Stems several slender 3 feet tall or less ⅙ inch through. Leaves usually simple obcuneate bilobed or with a few broad acuminate leaflets, about a foot long dark green mottled with lighter patches, nerves prominent numerous, six to nine in the lateral leaflets, petiole 4 inches long slender scurfy, sheaths 3 inches or less. Spathes oblong beaked 1 inch. Spike solitary (rarely branched) 1¼ to 4 inches long deflexed green, rachis slender tomentose. Flowers distichous. Males ⅛ inch long, sepals short rounded. Petals ovate acuminate. Stamens about 15, filaments very short. Females, sepals orbicular. Petals shortly cuspidate ovate. Pistil conic cylindric much longer than the petals. Stigma capitate. Drupe red ½ inch long cylindric ovoid acute, stigma discoid. Seed elliptic with a few streaks of rumination. Becc. Males. III. 123. Hook. fil. Fl. Brit. Ind. VI. 408. *P. bifida*, Bl. l.c. 92, t. 113, f. 2. *P. maculata* Port. Bot. Mag. t. 8011. *P. polymorpha*, Becc. Hook. fil. Fl. Brit. Ind. VII. 407, (in part). *Areca disticha*, Roxb. Fl. Ind. III. 620, Griff. Calc. Journ. Nat. Hist. V. 461. Palms Brit. Ind. 155, (in part). *A. curvata*, Griff. Ic. Pl. Ind. Or. t. 248 (not in Notulae III. 164). *Seaforthia disticha*, Mart. Hist. Nat. Palm 184. *Ptychosperma disticha*, Miq. Fl. Ind. Bat. III. 28.

Singapore: Selitar (Ridley) (Lobb); Johor: Batu Pahat, Gunong Panti (Ridley); Muar: (Fox 11,302); Malacca: Ayer Panas (Goodenough 1619), Base of Ophir (Ridley); Sungei Ujong: Perhentian Tinggi (Ridley); Selangor: Rawang, Bukit Hitam (Ridley); Pahang: Pulo Tawar (Ridley 3159), Kwala Tenok (3160); Perak: (Wray 2653), Bujong Malacca (Curtis 3347), Gopeng (King's Coll. 4423), Gunong Batu Putih (King's Coll. 8072) (Wray 365); Penang: Government Hill (Ridley 7907); Kedah Peak (Ridley).

In woods from sea level to about 2000 feet altitude, common over the whole peninsula. Malay name "Pinang Luggong." Distrib. Sumatra, and Southern Siam.

5. P. LIMOSA, Ridl. Journ. Roy. As. Soc. S. Br. Vol. 44. p, 201. Dwarf single stemmed palm about 2 feet tall with stout roots, stem ¼ inch through woody distinctly ringed internodes 1 inch long. Leaves 1 foot long 6 inches broad pale green, sheaths broad, petiole 3 inches long, blade entire obcuneate deeply bifid at the top, or more often lobed with about 5 lobes, lower ones acuminate or truncate with numerous short teeth, nerves numerous prominent. Spathe not seen. Spadix deflexed simple or with three branches slender 2 inches long. Flowers distichous alternate about 28. Calyx lobes short broad orbicular. Petals similar hardly as long. Fruit small ¼ inch long oblong, drying subacute white, ribbed when dry, seed with a fibrous testa, albumen ruminate.

Singapore: Selitar, (Ridley), Bukit Timah; Johor: Sungei Tebrau in thick wooded swamps (Ridley) Gunong Pulai (Ridley 12,196) on dry hills in forest. Allied to *P. disticha* but with solitary stouter stems, smaller and blunter oblong fruit, and the leaves pale green and almost always lobed.

6. P. ACAULIS, Ridl. Journ. Roy. As. Soc. S. Br. Vol. 44, p. 202. Stem short hardly 4 inches long covered with fibrous leaf bases, solitary. Leaves entire cuneate, tip bifid 15 inches long 6 inches wide or pumate with three pairs of linear oblong acuminate lobes each 4 nerved and 8 inches long, light green backs glaucescent. Spathes oblong 2 acute strongly keeled 1½ inch long ¾ inch wide. Spadix 2 inches long simple, densely covered with male flowers. Male flowers white ¼ inch long. Sepals acute. Petals subsymmetric ovate triangular acute. Stamens 8 or 12 shorter. Rachis crimson. Female flowers rose pink distichous with often one or two irregularly placed. Petals and sepals orbicular. Stigma irregularly oblong capitate. Rachis in fruit lengthening to 6 inches. Fruit cylindric narrow ¾ inch long.

Perak: Kamuning Woods, Sungei Siput (Machado). Endemic.

7. P. SUBRUMINATA, Becc. Males. III. 174. Stems short erect about 2 feet tall ⅜ inch through, internodes 1 inch long. Leaves narrowly cuneate deeply forked, apex truncate toothed, light green 12 inches long, 4 inches wide, nerves numerous and strong, petiole 2 inches long, sheaths 2 inches ribbed. Spathe lanceolate oblong 3 angled 1½ inch long. Spike solitary deflexed glabrous 4 inches long slender, thickening in fruit. Flowers distichous or spiral. Males ¼ inch long. Sepals deltoid acuminate, petals narrow linear. Stamens about 12. Females, sepals rounded spreading. Petals erect orbicular larger. Pistil conic. Drupe ½ inch long elliptic beaked red. Seed elliptic subacute, albumen. Hook. fil. l.c. 408.

Singapore: Kranji (Ridley); Johore: Bukit Tanah Abang (Kelsall, Serom, Batu Pahat (Ridley); Pahang: Rumpin River (W. Fox), Tahan River (Ridley); Perak: Briah, Larut (Wray 4219). Tapah (Wray 1425). (King's Coll. 7797, 1968); Penang: (King's Coll.); Muar: Sungei Pauh (Fox). Not rare, in forests to about 2000 alt.

A specimen from Muar collected by Mr. Fox is unusually large, the leaves 16 inches. Spathe 2 inches long. Inflorescence of 3 stout branches, the flowers partly distichous and partly spiral.

8. P. SUBINTEGRA, n.sp. Stem slender 3 or 4 feet tall hardly as thick as a pencil lower internodes 2 inches long. Leaves obcuneate entire deeply bifid at the top, petiole scurfy slender 2 inches long sheath narrow blade 8 inches long 2½ inch wide narrowed at base sides nearly parallel, tips truncate with about 6 teeth, nerves prominent 15 pairs. Midrib scurfy. Spadix simple deflexed 2½ inch long slender. Flowers distant, distichous. Sepals oblong orbicular. Fruit cylindric acuminate narrowed at the base ¾ inch long ⅛ inch through.

Perak: Bujong Malacca (Ridley 9798), Gunong Batu Putih at 3400 feet (Wray 908). Distributed by Sir George King as *Pinanga paradoxa* var. *subintegra* Becc. but certainly distinct from *P. paradoxa*. The leaves resemble those of *P. subruminata* but the stem is much more slender and taller.

9. P. CALAMIFRONS, Becc. Malesia III. p. 132. Stems slender dark brown when dry, ¼ inch through, internodes 2 inches long. Leaves over a foot long, rachis slender scabrid with brown scale-like hairs, leaflets about 32 very narrow linear acuminate about 6 inches long, inch wide, upper ones toothed dark above, reddish beneath when dry. Spike simple deflexed or 2 to 4 branched, flowers distichous. Males not known. Females sepals rounded orbicular dentate. Drupe subcylindric fusiform, apex acuminate ½ inch long, stigma rounded. Seed fusiform hardly ruminate. Kedah Peak (Ridley). Distrib. Borneo.

10. P. PARADOXA, Scheff. in Natuurk. Tijdschr. Ned. Ind. XXXII. 31. Stems several 3 to 12 feet tall, ¼ inch through, internodes 2 inches long. Leaves 12 inches long to 13 petiole 6 inches long or less, scurfy, leaflets 6 to 10 mostly alternate broad 5 inches long 1 wide, lower ones acuminate terminal one broadly cuneate deeply cleft, often unequally, margin truncate toothed. Spikes usually 2 or 3 on a stem unbranched or with 2 branches 3 to 4 inches long undulate. Flowers distichous males ¼ inch long. Sepals short acute. Petals lanceolate with long points. Stamens 6 filaments very short. Females calyx short lobes rounded, petals hardly longer. Drupe red slender curved fusiform ½ inch long. Seed fusiform, albumen ruminate with 6 long longitudinal lines of rumination. Becc. Malesia III. 129, Hook. fil. Fl. Brit. Ind. VI. 411. *Areca curvata*, Griff. Notul. III. 164, (partly) Not. Ic. Pl. As, t.

248. *A. paradoxa* Griff. Calc. Journ. Nat. Hist. V. 463. Palms Brit. Ind. 156, (Fruit only t. CCXXXVII. C. f. II. *Kentia paradoxa* Mart. Hist. Mat. Palm III. 312. *Nengella paradoxa* Becc. Males. II. 128. *Cladosperma* n.gen. Griff. Notul. III. 165.

Johor: Gunong Panti (Ridley); Malacca: Mount Ophir (Griffith) (Ridley 10123); Selangor: Bukit Kutu, Bukit Hitam (Ridley 7893); Perak: Larut Hills (Scortechini 427b, 2413); Negri Sembilan: Gunong Angsi (Ridley 11967); Kedah: Gunong Jerai (Ridley 5202). Endemic.

11. P. PECTINATA, Becc. Fl. Brit. Ind. l.c. 410. Stems several very hard dark green 10-"15" feet tall 1-"3½" inches through. Leaves 3-4 feet long leaflets about 15 inches long by 1-3 inches wide, narrowed at the base, linear acuminate with strong nerves, glaucous beneath. Spathe not known. Inflorescence with a stout base, branches erect 6-8, moderately stout 6 inches long. Flowers distichous, "Male calyx shorter than the petals," stamens numerous. Females flowers globose sepals and petals similar ribbed $\frac{1}{6}$ inch long. Drupe ½-"¾" inch long elliptic narrowed at both ends "purple black." Stigma small rounded. Seed elliptic small ribbed and grooved or smooth, deeply ruminate.

Johor: Gunong Pantai (Ridley), Kwala Sembrong (Lake and Kelsall) Sungei Tebrau (Ridley 11518); Perak: Goping alt. 5800 (!) (King's Collector); Selangor: Batu Tiga (Ridley 11966). Distrib. Endemic.

In damp woods. The altitude given in Fl. Brit. Ind. at Goping must be wrong as there is no mountain of that height there.

12. P. PERAKENSIS, Becc. Malesia III. 175. Stems 4-5 feet tall stout, internodes distinct reddish. Leaves 4 feet long, sheaths brown, rachis red when dry, leaflets narrow linear acuminate 18 inches long ½-1 inch wide glaucous beneath, keel distinct, nerves distinct only in the upper leaflets. Spathe thin oblong 5 inches long. Spadix 3 to 6 branched 4 or 5 inches long, branches moderately stout flattened. Flowers distichous. Males calyx three toothed. Stamens numerous. Females calyx lobes orbicular rounded. Petals shorter orbicular. Drupe at first cylindric fusiform crowned with the small pustular stigma, ripe fruit red, elliptic obtuse narrowed at the base ¾ inch long ¼ inch through, seed elliptic, very ruminate. Hook. fil. Fl. Brit. Ind. VI. 410.

Perak: Bujong Malacca (Ridley 9801), Gunong Keledang (Curtis 3348); Province Wellesley, Ara Kuda (Ridley 7024). Endemic.

13. P. MALAIANA, Scheff. Natuurk. Tijdschr. Ned. Ind. XXXII. 175. Stems about 12 feet tall stout 1 inch through, internodes 3 inches long. Leaves large 5 to 8 feet long pinnate, leaflets linear acuminate usually with 2 strong ribs dark green glaucous beneath 15 inches long ½-1 inch wide, petiole 18 inches long. Spathe about 10

inches long oblong. Compound spike deflexed stout 12 inches long, branches 2 to 5 rachis broad flattened, bright red in fruit. Flowers distichous. Males, sepals lanceolate. Petals much longer. Stamens 40 filaments very short. Females, sepals and petals very short. Stigma discoid. Drupes ¾ inch long at first cream colour at length black. Seed olive shaped base truncate apex blunt 1 inch long. Albumen ruminate. Becc. Malesia III. 137. Hook. fil. Fl. Brit Ind. VI. 410. *Areca haematocarpa* Griff. Calc. Journ. Nat. Hist. 165. *A. malaiana* Griff. l.c.c. 457. Palms Brit. India 252 t. 230. C. *Seaforthia malaiana* Mart. Hist Nat. Palm. III. 184. *Ptychosperma malaiana* Miq. Fl. Ind. Bat. III. 23.

Singapore: Chan Chu Kang (Ridley 3508); Johor: Gunong Panti (Ridley); Malacca: (Griffith) Jus (Goodenough 1499), Ayer Panas (130), Ayer Keroh (Ridley 10781); Sungei Ujong: Perhentian Tinggi (Ridley 10122); Pahang: Sungei Chenei (Fox), Kwala Lipis (Machado), Kwala Tenok (Ridley 3161); Selangor: Bukit Kudah (Ridley); Perak: Larut Hills (King's Coll. 3490). Batang Padang (King's Coll. 8120); Penang: Hill (Ridley) 7099. Distrib. Sumatra.

In damp woods to 1500 feet elevation. Native names "Pinang Dampong," "Pinang Boreng Hijau.

14. P. RIPARIA, Ridley Journ. Roy. As. Soc. S. Br. Vol. 44, p. 201. Stems distant 12-15 feet tall ½-1½ inch through internodes 3-4 inches long. Leaf about 3 feet long blade pinnate with 8 lateral lobes and 1 terminal bifurcating one green, rachis angled scurfy, lobes linear or linear lanceolate acuminate with 3-6 nerves 8-9 inches long 1¼-2 inches across, tip entire long acuminate, terminal lobes broad coarsely toothed many nerved. Spadix decurved peduncle stout ¾ inch long branches 3-4 stout 6-7 inches long. Flowers distichous close. Females globose, ⅛ inch long. Sepals orbicular ribbed, petals barely longer. Fruit ½ inch long oblong obtuse to ringed. Stigmas very short capitate.

Johor, swampy woods, banks of the Tebrau river near Castlewood (Ridley 11,518), growing in water, thowing up numerous stems from stolons.

Near *P. coronata*, Bl. but with a much smaller spadix.

15. P. PATULA, Bi. Rumphia II. 86, t. 115. Stems tufted slender 6-20 feet tall ½ to 1½ inch through, internodes 2¾ to 3¼ inch long. Leaf 2 to 3 feet long pinnate with 6 pairs of sigmoid leaflets acuminate with a long point, narrowed at the base, terminal one deeply bifid, apex toothed nerves 3 to 7, leaflets dark above 7 inches long 2 to 2½ inch wide. Spathe not known. Spike 4 branched deflexed, branches rather slender 6 inches long, red. Male flowers unknown. Females, sepals orbicular obtusely erose-crenulate. Petals smaller and rounder. Drupes flesh colour elliptic ribbed and when dry over ¼ inch long, apex adnate. Seed elliptic ruminate. Becc. Malesia III. 139. Hook. fil. Fl.

Brit. Ind. l.c. 411. *Seaforthia patula* Mart. Hist. Nat. Palm 323. *Ptychosperma patula* Miq. Fl. Ind. Bat. III. 26.

Pahang: Tahan River at Kwala Tenok (Ridley 3158); Perak: Ulu Bubong (King's Coll. 10702). Distrib. Sumatra and Borneo.

16. P. SINGAPORENSIS, Ridl. Journ. Roy. As. Soc. Vol. 41, p. 38. Stems tufted 6 to 15 feet tall dark green ¾ inch through, internodes 8 inches long. Leaves concolorous or a little paler along the back about 3 feet long, sheath tubular, petiole 8 inches long, leaflets sigmoid acuminate about 13, subopposite terminal one forked, 12 inches long by 3 inches wide or less, nerves 5 to 7. Spike branched erect 4 inches long, branches 5. Spathe thin boat-shaped papery with a short point brownish pink 1½ inch long. Rachis cream scurfy. Flowers distichous. Male ¼ inch long ivory white. Sepals very small acute. Petals oblique ovate acuminate much larger. Stamens 14 white filaments very short. Anthers oblong, no pistillode. Female petals and sepals broadly oblong pink edges ciliate. Stigma small sessile papillose circular entire.

Singapore: Bukit Timah, Mandai, Seletar (Ridley 11267); Muar: Sungei Segal (Fox). Endemic and rather scarce.

3. NENGA, Wendl.

Medium sized palms, tufted. Leaves pinnate, leaflets linear acuminate. Compound spikes deflexed, flowers spiral or in 4 or 6 series. Sepals and petals subequal subulate in male. Stamens 6. Seed ovoid short base truncate, ovule parietal.

Species 3, Malayan.

Fruit 1 inch long	1. *N. Wendlandiana.*
Fruit 1½ inch long	2. *N. macrocarpa.*

1. N. WENDLANDIANA, Scheff. Ann. Jard. Bot. Buitenz. 1. 153. t. 9-10. Stems several 10-15 feet tall, 1½ inch through dark green. Leaves 5 feet or more long, leaflets alternate linear finely acuminate, 12-15 inches long, petiole 2 feet long sheath purplish. Spathe falcate ensiform 7-9 inches long 1 inch wide. Spikes 3 or 4 branched a foot long decurved rachis moderately stout. Flowers spiral, 2 males to one female except at the tips where there are no females. Males creamy yellow. Sepals linear acuminate ¼ inch long. Petals broader lanceolate acuminate shorter. Stamens linear 6 pink. Females pinkish cream colour. Sepals orbicular, petals somewhat larger. Pistil globose with 2 short ovoid teeth. Drupe oblong 1 inch long apex blunt rounded claret coloured. Seed shortly ovoid blunt base truncate intruded, ruminate. Becc. Malesia I. 25. III. 182, Ann. Jard. Buitenz. II. 83. Hook. fil. l.c. 412. *N. pumila* Wendl. Kerchov. Palm 251. *N. intermedia* Becc. l.c. 85. *Pinanga Nenga* Bl. Rumphia II. 77. t. 107. *Areca*

Nenga Bl. Mart. Hist. Nat. Palm III. 179. *A. pumila* Griff. Calc. Journ. Nat. Hist. V. 456. Palms of British India 151. Miq. Fl. Ind. Bat. III. 14.

Singapore: Garden Road, Changi (Ridley 3157), Seletar (3163, 3164, 3165, 6291); Johor: Batu Pahat (Ridley); Malacca: Ching (Griffith); Dindings: Bruas (Ridley); Pahang: Pekan (Ridley); Perak: Larut (King's Coll. 4022).

In low swamps in woods in the plains, common. Native names "Pinang Umu," "Pinang Antan." Distrib. Sumatra.

var. *hexapetala* Becc. Males. III. 183, is apparently a monstrosity with six petals, once collected in Perak by Scortechini.

2. N. MACROCARPA, Scort. in Becc. Malesia III. 184. Stems few together 6 to 18 feet tall. Leaves 3-4 feet long leaflets linear acuminate 18 to pairs, often broad and strongly ribbed. Spathe purplish oblong. Peduncles stout, spikes 2-3 deflexed thick over a foot long. Male flowers $\frac{3}{8}$ inch long. Sepals narrow linear acute. Petals lanceolate acute. Stamens 6, filaments short. Anthers linear base sagittate. Females, sepals and petals suborbicular. Fruiting calyx very large $\frac{1}{4}$ inch across. Drupes ellipsoid black terminated by the trifid triangular stigmas $1\frac{1}{2}$ inch long. Seed ovoid under $\frac{1}{2}$ inch long albumen strongly ruminate. Hook. fil. Fl. Brit. Ind. VI. 412.

Johor: Gunong Panti (Ridley); Negri Sembilan: Tampin Hill (Goodenough 1844); Pahang: Tahan River, Kwala Tenok (Ridley); Perak: Larut Hills (Scortechini 547a, 302b), Gunong Keledang (Curtis 3349), Bujong Malacca (Ridley), Goping (King's Coll. 4775), Gunong Batu Putih (Wray 930); Kedah: Gunong Jerai (Ridley).

Common in the hill woods from 1500 to 3400 feet elevation. Endemic.

4. ORANIA, Zippel.

Tall stout unarmed simple-stemmed palms. Leaves large pinnate, leaflets linear acuminate petiole stout, sheath short. Spathes 2 the lower one short tubular, upper one large oblong. Inflorescence large pendulous, many branched. Flowers small, all males on the ends of the branches, lower ones in three female between two males. Male, calyx short tufted. Petals oblong or lanceolate. Stamens 3 to 6 filaments subulate, anthers erect pistillodes conic. Females, calyx short, petals ovate. Pistil conic, 3 angled 3 celled. Stigmas recurved ovules pendulous. Fruit globose large, stigmas basilar. Seed globose albumen equable.

Species 4 or 5 Malayan.

O. MACROCLADUS, Mart Hist. Nat. Palm III. 186, 177, f. I. Stem 40 feet tall or more about 6 inches through smooth grey. Leaves

12-15 feet long, leaflets pendulous numerous linear acuminate white beneath 3 feet long, 2 inches wide. Inflorescence paniculate decurved branches over a foot long slender. Flowers scattered. Males ovoid $\frac{1}{8}$ inch long, white, calyx short saucer-shaped, with 3 round lobes. Petals ovate ribbed. Stamens 6. Females, calyx as in male, petals ovate $\frac{1}{8}$ inch long. Fruit 1-1$\frac{1}{2}$ inch through globose green. Seed globose. Becc. Ann. Jard. Bot. Buitenz. II. 152, 164, 13. Hook. fil. Fl. Brit. Ind. VI. 423. *Macrocladus sylvicola* Griff. Calc. Journ. Nat. Hist. V. 489. Palms Brit. Ind. 177, t. 239. A. B.

Singapore: Chan Chu Kang, Pulau Ubin (Ridley); Pahang: Tahan River woods (Ridley); Malacca: Ching (Griffith); Dindings: near Lumut, Bujong Malacca (Ridley). Distrib. Java. Woods to about 1000 feet elevation. Native name "Ibul."

5. Oncosperma, Bl.

Tall armed palms soboliferous. Leaves pinnate leaflets narrow inflorescence large deflexed of many long spikes on a short broad armed peduncle. Spathes two very large deciduous armed. Flowers spirally arranged, 2 males to female terminal ones all male. Male flowers asymmetric, petals lanceolate cuspidate. Stamens 6-12. Pistillode large. Females, petals ovate, stigmas minute. Drupe globose black, seed globose ruminate. Species 5 or 6. Ceylon and Malay region.

Leaflets drooping.	Fruit $\frac{1}{4}$ inch through	1. *O. filamentosa.*
Leaflets spreading.	Fruit $\frac{1}{2}$ inch through	2. *O. horrida.*

1. O. filamentosa, Bl. Rumphia II. 97, t. 82, 103. Stems numerous about 60 feet tall and 6 inches through grey armed with strong black spines. Leaves about 10 feet long, petiole spiny, leaflets drooping linear acuminate dark green 1 inch across. Spathes broad oblong 2 feet long, 6 inches wide, apex broad and flat, with two rows of black spines along the two keels, inner spathe brown tomentose. Inflorescence 2 feet long, branches about 55 yellow, peduncle broad with few spines. Male flowers yellow. Sepals ovate triangular, with a thickened keel almost free to base, petals lanceolate cuspidate $\frac{1}{4}$ inch long. Stamens 6, filaments fleshy triangular adnate to the petals. Pistillode large conic with 3 processes. Females nearly $\frac{1}{4}$ inch long yellow. Sepals orbicular, petals ovate about as large as the globose pistil. Stigmas triangular. Drupe globose black $\frac{1}{4}$ through. Seed scantily ruminate. Hook. fil. Fl. Brit. Ind. VI. 414. *O. cambodianum* Hance. Journ. Bot. 1876, 261. *Areca tigillaria* Jack. Malay Misc. II. VII. 88, Griff. Calc. Journ. Nat Hist. V. 423. Palm Brit. Ind. 159, t. 133, B. *A. nibung* Mart. Hist. Nat. Palm III. 173, 311, t. 153.

Singapore: common, Tanglin, Changi (Ridley 3519). Kranji (4163). Sungei Buloh (1663, 3539); Johor; Malacca: Pringgit and near the town. Distrib. Cochin-China, Borneo.

The wood of the nibong is used for many purposes, in building for flooring, bridges and such like, also for pig spears. Sharpened spears of it are driven into the ground in lalang at such an angle that the point is about the level of the breast of a pig. The spears are pointed towards the garden to be protected from the wild pigs and quite concealed in the grass, when the pigs invade the garden the natives startle them by shouts and other noises, the pig rush out and are impaled on the spears. The palm is common, especially near the sea and tidal rivers. The natives distinguish several forms under the names of Lenau (Changi, Ridley 3519) Ibas or Ibu (Seletar Ridley 3520) and Nibong Padi (Tengeh Ridley 3511) but I can see no specific or even varietal differences.

2. O. HORRIDA, Scheff. Natuurk. Tijdschr. Ned. Ind. XXXII. 189, Ann. Jard. Buitenz. I. 159. Stems several 40 to 60 feet tall, 6 inches through grey armed with black spines. Leaves 20 feet long or less, petiole thorny spines at base very long, sheath broad 2-3 feet long spiny leaflets linear acuminate about 60, 3 feet long 1-1½ inch broad. Spathes 2, outer one oblong obtuse or cuspidate spiny 18 inches long, nearly 12 inches across inner smaller 12 inches long, 4 inches wide spiny. Inflorescence deflexed many branched about 15 branches, 2 feet long, peduncle broad strongly spiny. Flowers as in *O. filamentosa* golden yellow. Males, sepals short rounded, petals lanceate yellow. Stamens 6 shorter filaments stout, pistillode trifid lobes thick at base tapering upwards nearly as long as the stamens. Female sepals small ovate, petals larger ovate blunt, pistil globose. Styles short deltoid edges undulate. Drupe globose, black ½ inch through or more, pericarp crustaceous. Seeds globose albumen ruminate. Hook. fil. l.c. 415. *Areca horrida* Griff. Calc. Journ. Nat. Hist. V. 465. Palms of British India 158, t. 233, C. Mart. Hist. Nat. Palm III. 312.

Dry forests common; "Bayas."

Singapore: Tanglin, Bukit Timah, Changi (Ridley 3510). Mandai (Ridley 3156, 3518); Johor: Pahang Tahan River; Perak: Bujong Malacca. Distrib. Borneo.

6. PTYCHORAPHIS, Becc.

Stems tufted slender ringed unarmed. Leaves pinnate with narrow leaflets. Spathes 2, deciduous sword-shaped. Inflorescence infrafoliar deflexed, of several slender spikes on a short peduncle. Flowers in pairs 1 female, or males only at the tips, and females only at base. Male sepals ovate, petals or oblong longer. Stamens 6, filaments slender. Pistillode large conic. Female with a short bract. Petals short, stigmas minute. Drupe ellipsoid. Seed ellipsoid grooved on one face ruminate.

Species 2, Endemic.

Rachis densely flowered thick. Petals ovate ... 1. *Pt. singaporensis.*
Flowers scattered rachis thin. Petals lanceolate 2. *Pt. longiflora.*

1. Pt. singaporensis, Becc. Ann. Jard. Bot. Buitenz. II. 90, t. 196. Males. III. 109. Stems several 6 to 12 feet tall, 1 inch through, black, ringed. Leaves pinnate, petiole nearly 3 feet long, blade 4 feet leaflets narrow linear acuminate 12 inches long ½ inch wide, rachis scurfy. Spathe sword-shaped 6 inches long ¾ inch wide apex rounded, convex outside broadly channelled inside winged inner spathe shorter narrower not winged woolly. Inflorescence deflexed 6 inches long. Spikes moderately slender ⅛ inch thick about 5-7, rachis olive green. Flowers in pairs numerous and close, a male and female together, or females only at base, males at tip. Males sepals ovate orbicular, petals larger ovate acute white or yellow ⅛ inch long. Stamens 6 filiform white. Anthers small oblong dorsifixed. Pistillode large conic. Female with a transversely oblong bract. Sepals ovate truncate gibbous green petals shorter ovate acute green. Pistil obovoid. Stigmas minute triangular. Drupe ellipsoid red pulpy ½ inch long. Seed elliptic grooved on one face ⅜ inch long ruminate. Hook. fil. lc. 413. *Ptychosperma singaporensis* Becc. Males. I. 61. *Rhopaloblaste singaporensis* Hook. fil. Gen. Pl. III. 892. *Drymophloeus singaporensis* Hook. fil. Kew. Gard. Rep. (1882, 1884) 55.

Singapore: Tanglin, Sungei Buluh (Ridley 2135); Chan Chu Kang (2134) Toas (3137) Kranji (2136); Johor: (Ridley 2135) Gunong Pulai (Hullett); Dindings: Lumut (Curtis 3443).

In dry woods. Native name "Rintin or Kerintin." The stems which are quite black make beautiful walking sticks. Endemic.

2. Pt. longiflora, Ridl. Journ. Roy. As. Soc. S. Br. Vol. 41, p. 32. Habit and stems that of *P. singaporensis*. Leaf 3 feet or more long, rachis brown scurfy leaflets linear acuminate 5 ribbed, alternate about 40 pairs 18 inches long ½ inch wide. Peduncles stout 1 inch long ribbed scurfy, branches of inflorescence slender 4-5, scurfy 6-7 inches long. Flowers in pairs 1 male and 1 female, scattered about 21 pairs on a branch, males $\frac{3}{16}$ inch long with 2 orbicular gibbous bracts at the base. Calyx lobes orbicular fringed. Petals lanceolate obtuse much longer. Stamens 6, shorter than the petals, filaments with a broad base narrowed upwards. Anthers oblong dorsifixed. Pistillode conic stout as long as the stamens. Females. Bracts 1 small. Sepals orbicular ciliate. Petals ovate, orbicular imbricate. Pistil ovoid.

Johor, Batu Pahat on Gunong Banang (Ridley 1121).

This differs from *Ct. singaporensis* in its slender branched inflorescence with distant flowers and lanceolate petals. Endemic.

7. Cyrtostachys, Bl.

Unarmed tufted palms. Leaves pinnatisect. Inflorescence pendulous of many spikes. Spathes 2, deciduous. Flowers 2 female

between two males, in spirals. Male flowers symmetric, petals ovate. Stamens 11-15, filaments slender bases adnate to the pistillode. Female, petals larger than sepals. Stigmas 3. Pistil ovoid. Drupe small obovoid. Seed ovoid, albumen equable, embryo basilar.

C. LAKKA, Becc. Ann. Jard. Bot. Buitenz. II. 141. Stems tufted 12-15 feet tall, 3 inches through olive green smooth except for the nodes, internodes 6 inches long. Leaves erect pinnate 5 feet long, petiole 6 inches red, sheath 2 feet long red, leaflets linear with long points, about 25 pairs dark green above glaucous beneath 18 inches long 1½ inch wide, rachis red. Spathes broad oblong curved. Inflorescence long deflexed green finally red with 25 branches. Flowers spirally arranged 1 female between 2 males. Males sepals ovate green edged red, petals longer ovate green. Stamens 11 (12 or 15), filaments slender bases adnate to the pistillode longer than the petals white. Anthers small oblong. Pistillode thick. Styles 3 base thickened and narrowed upwards, shorter than the stamens. Female sepals broadly rounded, petals ovate much larger green pistil globose. Stigmas short thick recurved brown. Drupe small obovoid black base scarlet, pulp thin. Seed ovoid ¾ inch long, albumen equable embryo basilar. Hook. fil. Fl. Brit. Ind. VI. 414.

Singapore: Kranji, Jurong (Ridley 3762); Pahang: near Pekan; Selangor: Klang; Perak: Teluk Anson. Distrib. Borneo.

Banks of tidal rivers. Native name "Pinang Rajah."

8. IGUANURA, Blume.

Small unarmed palms. Leaves entire cuneate and deeply bilobed or pinnatisect with few broad leaflets. Spathes 2 short persistent. Spike simple or compound on a long peduncle branches spreading usually slender. Flowers small spiral, 1 female between 2 males or males only at the ends of the branches, sunk in sockets on the smooth or tomentose rachis. Males, sepals orbicular petals oblong connate at base lanceolate or ovate. Stamens 6 or 9. Pistillode long and stout. Female sepals and petals rounded, petals ovate. Staminodes 6. Ovary ovoid 1-3 celled. Stigmas sessile. Ovule 1 parietal. Fruit oblong small at first white then red finally black. Stigmas subbasilar. Seed suberect albumen ruminate or equable.

Species 10. Malayan.

Leaves cuneate, bifid or few lobed.

Spikes simple (rarely branched) thick or slender long.

Inflorescence of several short spikes ... 1. *I. geonomaefromis.*

Leaves cuneate bifid, 3 feet long, stem stout ... ... 2. *I. spectabilis.*

Leaves cuneate bifid or pinnatisect with few leaflets, stem slender ... ... 3. *I. Wallichiana.*

Leaves with trapezoid leaflets, stems slender.

Spikes several.

Inflorescence a simple spike, fruit conic cylindric incurved ... ... 4. *I. corniculata.*

Inflorescence a compound spike.

Fruit ovoid ... ... 5. *I. polymorpha.*

Fruit cylindric curved ... ... 6. *I. ferruginea.*

Fruit 2 horned ... ... 7. *I. bicornis.*

1. I. GEONOMAEFORMIS, Mart. Hist. Nat. Palm III. 229, 178. Stems short, about 2-3 feet tall few together. Leaves erect cuneate oblong deeply bifid or more or less lobed with from 2 to 9 lobes and a terminal bifid one, lobes acuminate except the crenulate terminal one, 18 to 24 inches long dark green strongly ribbed, midrib on both surface more or less red tomentose, petiole 1 foot long. Spikes from between the lower leaves, simple or more rarely 2-3 branched, a foot long stout tomentose or slender and glabrous peduncle 3 to 24 inches long. Spathes narrow lanceolate acuminate 6 inches long ¼ inch wide. Flowers numerous spiral. Males, sepals short orbicular. Petals oblong connate at the base ribbed. Female flowers ⅛ inch long. Sepals rounded striate. Petals longer ovate cuspidate, shorter than the pistil. Ovary fusiform. Stigmas short recurved. Staminodes 0. Drupe ellipsoid ½ inch long. Seed ¼ inch long longitudinally grooved black ruminate. Hook. fil. Fl. Brit. Ind. VI. 415. *Slackia geonomaeformis* Griff. Calc. Journ. Nat. Hist. V. 469. Palm Brit. Ind. 162, t. 234.

var. A. *typica.* Spike unbranched woolly tomentose stout.

Singapore: Bukit Timah (Ridley 3140); Malacca: (Griffiith), Sungei Hudang (Derry 175), Base of Mount Ophir (Ridley 3141); Johor: Gunong Panti (Ridley), Kwala Simpai (Kelsall); Pahang: Tahan River (Ridley); Selangor: Ginting Bedai, Rawang, Ginting Peras (Ridley 7881).

sub. var. *ramosa,* Inflorescence with 2 to 3 branches. Pahang: Kwala Tenok (Ridley 3138); Singapore: Chan Chu Kang (Ridley 1664); Malacca: (Griffith), Mount Ophir (Hullett), Ayer Panas (Goodenough 1881); Negri Sembilan: Perhentian Tinggi (Ridley), Tampin Hill (Goodenough 1881, 1911); Selangor: Pahang Track (Ridley).

Griffith's type of *Slackia geonomaeformis* belongs to this subvariety.

var. B. *malaccensis.* *I. malaccensis* Becc. Males. III. 102, Hook. fil. l.c. 416. Spike simple slender finely tomentose or nearly glabrous.

Malacca: Ayer Panas (Ridley); Pahang: Kota Glanggi (Ridley); Pahang: Bukit Kutu (Ridley 7889); Pahang: Track Form with 3

branches on the inflorescence) (Ridley); Kwala Lumpor: Perak, Larut (King's Coll. 1869, 2994), (Ridley 11,434), Waterloo Estate, Kwala Kangsar (Glasgow).

Common in wet spots especially streams in the dense forests rarely above 1000 feet elevation. A very variable plant both in foliage and in inflorescence. The form *malaccensis* has entire or lobed leaves, as has the typical plant, so that this cannot be used as a character for the variety. The Malay names are "Pinang Pachat," "Pinang Burong Tikus," and "P. K'lasak." Endemic.

2. I. SPECTABILIS, Ridl. Journ. Roy. As. Soc. S. Br. Vol. 41. p. 40. Stem from 3 to 8 feet tall, tufted or solitary very stout over 1½ inch through. Leaves entire cuneate bilobed at the apex margins crenulate toothed strongly ribbed, 3 or or more feet long, 1 foot wide, peliole 6-12 inches. Inflorescence from among the leaves, peduncle over a foot long, with 2 sheaths 6 inches long and a bractlike ovate acute leaf ¼ inch long above, branches stout 4 to 7, ascending, 6 inches long deep green. Flowers spirally arranged, sunk in the rachis. Males, sepals ovate. Petals oblong acute twice as long ⅛ inch. Stamens 6 longer that the petals, filaments thick connate at the base with the long cylindric obtuse pistillode. Females sepals rounded. Petals ovate rounded. Fruit elliptic with a curved apex black when ripe ¾ inch long, on the thickened rachis. *Geonoma Pynaertiana* Mast. Gard. Chron. 1898, Br. 258, f. 28.

Perak: Hermitage Hill (Ridley); Dindings: Bruas (Ridley 8403) (Curtis).

In damp woods. Native name "Teruno." Endemic.

3. I. WALLICHIANA, Hook. fil. Gen. Pl. III .908. Fl. Brit. Ind. l.c. 416. Stem slender about 4 feet tall, to 12 feet. Leaves simple cuneate deeply forked 30 inches long by 9 inches wide or more or less pinnatisect, leaflets long and narrow with long points dark green 13 to 15 inches long, midrib stout triangular petiole triquetrous over a foot long. Spathes narrow 6 inches long. Compound spike about 2 feet long on a slender peduncle 18 inches long, branches about 8 crowded at the top 6-12 inches long slender. Flowers in pairs scattered on the rachis ⅛ inch long. Males sepals short ovate. Petals oblong obtuse twice as long. Stamens 6 filaments filiform. Anthers linear dorsifixed pistillode large. Females sepals orbicular. Drupe ellipsoid red ½ inch long. Becc. Malesia III. 100. *Areca Wallichiana* Mart. Hist. Nat. Palm. III. 178.

Pahang: Tahan River (Ridley), Kwala Lipis (Machado); Muar: Sungei Pauh (Fox); Perak: Larut Hills (Ridley), Bujong Malacca (Ridley 9802), Tapa (Wray 1413), Goping (King's Coll. 454), Salama (King's Coll. 3127); Penang Hill (Porter in Wallich's Coll. 8600) (Ridley 7101, 10344); Province Wellesley: Ara Kudah (Ridley 7022)

Native name "Pinang Sapadan." In damp woods to 4000 feet alt. Lobb's plant from "Singapore" (Fl. Brit. Ind. l.c.) is doubtless wrongly localised. Some of the specimens of King's collection, viz. 431 and 8227 described as the var. *major* Becc. in the Flora of British India are apparently either large forms of *I. geonomaeformis* or *I. spectabilis* Ridl.

I. diffusa, Becc. Hook. Fl. Brit. Ind. l.c. from Gunong Hijau, Larut Hills (Scortechini) of which there is a sketch in the Kew Herbarium, seems to be a large form of this species with the branches of the inflorescence branched.

I. parvula Becc. l.c. 417, Perak (Scortechini drawing in Herb. Kew) is I think a small form of the same thing. Only a single specimen seems to have been found.

4. I. CORNICULATA, Becc. Males. III. 187. Stem slender 3 to 4 feet tall barely $\frac{1}{4}$ inch through, internodes $\frac{3}{4}$ to $1\frac{1}{4}$ inch long. Leaves pinnatisect 10 to 12 inches long, 6 to 8 inches wide, leaflets 5-6 pairs cuneately trapezoid $3\frac{1}{2}$ to 4 inches 1-$1\frac{1}{2}$ inch wide narrowed at the base and ending at the apex in a tail, furfuraceous beneath, petiole slender 4 inches long. Inflorescence a simple spike 8-12 inches long including the peduncle 3-4 inches. Spike rusty scurfy, flowers spirally arranged. Spathe 1 slender tubular. Male flowers very small. Fruit narrow elongate conical tip incurved, granulate $\frac{2}{3}$ to $\frac{3}{4}$ inch long $\frac{1}{5}$ inch wide. Hook. fil. Fl. Brit. Ind. VI. 417.

Perak, Selama (Kunstler 3131) at 3-400 elevation. Endemic.

5. I. POLYMORPHA, Becc. Males. III. 182. Stems very slender 3 to 7 feet tall $\frac{1}{4}$ inch through. Leaves pinnate 8-15 inches long with 4 to 12 trapezoid leaflets narrowed at the base upper margin acuminate 4 inches long $1\frac{1}{4}$ to to 3 inches wide dark green sheaths narrow 3-6 inches long, petiole slender. Inflorescence from below the leaves peduncle slender 4 inches long or less, glabrous, branches 6 to 9 slender about 6 inches long. Flowers very small in scattered pairs. Males sepals short rounded. Petals oblong obtuse twice as long. Females sepals short rounded. Petals longer strongly ribbed when dry. Ovary conic. Styles short recurved. Drupe ovoid or elliptic ovoid. Hook. fil. Fl. Brit. Ind. VI. 417. *I. brevipes* Hook. fil. l.c. 416.

Perak, (Scortechini 318b), Larut Hills (Curtis 2078), King's Coll. 2022), Bujong Malacca (Ridley 9803).

var. *canina* Becc. Males. III. 190. Hook. fil. Fl. Brit. Ind. 417. Inflorescence with more numerous and thicker branches, flowers subdistichous.

Perak (Scortechini), Larut Hills (Ridley). Endemic.

6. I. FERRUGINEA, Ridl. Journ. Roy. As. Soc. S. Br. Vol. 41, p. 40. Stem slender short. Leaves 18 inch long, petiole 4 inches rachis red

scurfy, leaflets 5 or 6 pairs alternate trapezoid base narrowed apex acuminate margins more or less toothed, 6 inches long 3 inches wide. Spathe 6 inches long acuminate. Inflorescence peduncle 6 to 8 inches long red tomentose, branches thick 9 to 11 sometimes branched again, 6 inches long covered with red wool. Flowers scattered distichous foveolae covered with red hair. Male flowers glabrous, sepals ovate rounded. Petals lanceolate ribbed one-third longer. Females sepals similar. Petals shorter blunter. Drupe cylindric curved slightly narrowed towards the tip, black ½ inch long. Seed cylindric acute curved rugose ⅜ inch long, albumen equable.

Perak : Larut Hills common from about 2000 feet upwards (Fox, Ridley 10684, 11405). Bujong Malacca (Curtis 3164).

This has the habit of *I. polymorpha*, but the stouter inflorescence on a longer peduncle and covered with red wool, the larger flowers, and curved cylindric fruit and seed make it very distinct.

7. I. BICORNIS, Becc. Males. III. 188. Stem 5 to 8 feet tall about ½ inch through. Leaves a foot long pinnatisect 4-6 inches wide, leaflets 2 to 4 pairs, terminal one deeply bifid, laterals sigmoidly trapezoid apex acuminate petiole 3 to 4 inches long glabrous. Inflorescence very shortly peduncled, branches 5 to 8 filiform slender deflexed, 4 to 8 inches long, peduncle ¾ to 1¼ inch long. Flowers minute. Spathe deciduous. Fruit oblong narrowed at the base and bilobed, with rounded lobes ½ inch long. Hook. fil. l.c. 417.

Perak : (Scortechini 1188), Larut Hills 3500 to 4000 feet alt. (Kunstler 6375). Endemic.

2. CARYOTIDAE.

9. ARENGA, Labill.

Large palms unarmed, with a stout tall or short single stem or several together. Leaves enormous pinnate, petiole stout, sheath broken up into wiry black fibres, leaflets very numerous linear auricled at the base, apices truncate notched. Inflorescence very large with numerous short spathes covering the base of the peduncle persistent, branches very numerous long pendant, unisexual, very rarely bisexual. Male flowers large symmetric. Sepals orbicular, petals much longer oblong valvate. Stamens very numerous filaments short. Anthers linear erect apiculate. Female flower subglobose oblong or flattened at the top, sepals suborbicular, petals triangular ovate. Staminodes many or not. Ovary 3 celled. Stigmas short triangular. Ovules 3. Fruit oblong, or subglobose 2-3 seeded. Seed plano-convex large, albumen equable, embryo dorsal.

Species about 10. India, Malaya, Formosa, Australia.

Note.—The inflorescences are produced when the tree is adult from the top downwards, the stems dying as the last are produced.

Stems very stout usually solitary.
Petals in male oblong ... ... 1. *A. saccharifera.*
Stems more slender not solitary.
Petals short oblong ovate ... ... 2. *A. Westerhouti.*

1. A. SACCHARIFERA, Labill. Mem. Inst. Fr. VIII. 209. Stems usually solitary, occasionally 2-3, about 20 to 30 feet tall and 12 inches or more through. Leaves 20 feet long, petiole very stout sheaths short broken up into strong black fibres, leaflets about 60 pairs alternate linear, base unequally auricled, apex notched and toothed dark green above glaucous beneath, 25 inches long 1-1½ inch wide. Spathes 5 lanceolate oblong sheathing the peduncle. Inflorescence axillary alternately male and female, spikes numerous 3 to 4 feet long, rachis stout ½ inch through green woody. Male flowers in pairs spirally arranged. Sepals sub-orbicular truncate imbricate ¼ inch long green. Petals 1 inch long oblong thickly coriaceous blunt, violet. Stamens very numerous about 80, filaments short white ⅛ inch long. Anthers slender ½ inch long orange, sagittate apiculate. Female flowers, sepals orbicular, petals tringular ovate ½ inch long acute green, ovary subtringular rounded top flattened, three ridged, styles short tringular, ovules 3. Fruit oblong or subglobose yellow, obscurely three angled, top depressed 2 inches long pulpy 3 seeded. Seed 1 inch long black back rounded, albumen equable. Mart. Hist. Nat. Palm 191, t. 108, and 161, fig. 4. Miq. Fl. Ind. Bat. III. 35. Kurz. Fl. For. II. 534, Griff. Calc. Journ. Nat. Hist. V. 472, Palms Brit. Ind. 164. t. 135 A. Hook. fil. Fl. Brit. Ind. VI. 431. *A. Griffithii*, Seem. (Kerchov. Palm 432). *Saguerus Rumphii* Roxb. Fl. Ind. III. 626. *S. saccharifer* Wurmb. Verh. Bat. Genootschap I. 350. Bl. Rumphia II. 128, t.123-4. *Gomutus saccharifer* Spreng. Syst. II. 622. *Borassus Gomutus* Lour. Fl. Cochin-ch. II. 759.

Common over the whole peninsula in villages and wild on dry hills. Native name "Kabong," "Enau." I met with this palm apparently in a truly wild state in Bukit Jugra, Province Wellesley. The stems were not so densely covered with black fibre as in the common village form and were more slender. The Malays called this plant "Enau," and seemed to consider it different. The fibre from the leaf sheaths is used for making black rope under the native name of "Tali Hijau;" it is very strong and durable and stands submersion in water for a long time. There is a portion of a cable of this rope in the Sandakan museum in Borneo which was found attached to a very old anchor in one of the rivers and is supposed to have been used in one of Dampier's voyages. The fibre is still very strong and but little altered, after so long a lapse of years. This fibre has been imported into England for various purposes under the name of Vegetable Horse Hair. The trunk of the tree split and scooped out is used for conduits. The rachis of the leaf is sometimes made into quaint walking sticks.

Sugar and molasses is obtained from the flower shoots, by slicing the end off and catching the sweet sap in bamboos, and boiling it down; this sugar being known as "Gula Malaka." The inner portion of the trunk is pithy and very sweet tasted. The fruits are made into a sweetmeat.

2. WESTERHOUTI, Griff. Calc. Journ. Nat. Hist. V. 474. Palms of British India 166, t. 235, B. C. D. Stems solitary or soboliferous 16 to 30 feet tall, 6 to 8 inches through, rings prominent 6 inches apart, internodes bare smooth and grey. Leaves 16 to 18 feet long, rachis as thick as a man's wrist, leaflets linear apex truncate and notched with short teeth, base auricled dark green above glaucous beneath, about 80-90 pairs; 24 to 60 inches long, 1-2½ inch wide. Male inflorescence 18 inches long with 16-18 branches 8-9 inches long. Flowers nearly ¾ inch long. Sepals short broad gibbous orbicular ⅛ inch long. Petals ovate oblong ½ inch long pink. Stamens very numerous ¼ inch long filaments very short and broad. Anthers linear terminated by a subulate brown point. Female, sepals short rounded, petals triangular ovate ½ inch long. Stigmas small triangular. Fruit oblong depressed at the top 2 inches long, 2½ inches through, yellowish green and black. Seeds 2-3 flattened oblong black ¼ inch through. *A. obtusifolia* Hook. fil. Fl. Brit. Ind. V. 421, (not of Martius). *Saguerus Langkab* Bl. Rumph. II. 131 t. 96, 125.

Malacca: Naning (Westerhout); Negri Sembilan: Tampin Pahang, Kwala Tahan (Ridley); Penang Hill (Lewis, Curtis); Province Wellesley common on the hills, Bukit Langkap; Perak: Bukit Kapayung; Thaiping Hills.

In dry wooded hills often very abundant. Native name "Langkap." The pith is eaten in curries by Malays. Endemic.

10. DIDYMOSPERMA, Wendl.

Dwarf palms unarmed. Stems solitary or tufted. Leaves cuneate oblong acute entire or pinnatisect with trapezoid leaflets. Inflorescence simple or branched with numerous persistent spathe unisexual. Flowers rather large. Males, calyx cupular 3-fid. Petals oblong. Stamens 10-30. Anthers linear, no pistillode. Females sepals rounded. Petals triangular thick. Ovary depressed 3 angled 2-3 celled. Stigmas conical. Fruit globose or ovoid 1-3 celled. Seeds 1 to 2 oblong elliptic planoconvex. Albumen, equable.

Species 6. Assam and Malaya.

D. HOOKERIANA, Becc. Males. III. 186. Stem solitary or several together about 12 to 13 inches tall, ¼ inch through covered with old leaf-sheaths with many black fibres. Leaves very variable simple trapezoid cuneate or oblong with a narrow base erose with a toothed margin and several point 7 to 9 inches long 3-4 inches wide petiole 4 to 6 inches long or pinnatisect with 2-4 pairs of leaflets inequilateral

shortly, petiole with a broader terminal one ending in 2 points 18 inches long, or more, the leaflets 9 inches long 3 wide. Spathes several linear persistent 4 inches long or less, sheathing the peduncle of the spadix. Spike erect slender 3-8 inches long unisexual. Male flowers, sepals ovate rounded ribbed petals $\frac{1}{8}$ inch long ribbed. Stamens numerous. Anthers linear. Females, spadix stout 3-8 inches long in fruit. Sepals ovate ribbed $\frac{1}{8}$ inch long. Pistil large globose orange. Drupe globose $\frac{1}{4}$ inch through, pericarp crustaceous. Seeds 3, elliptic back rounded, inner face angled and grooved $\frac{1}{4}$ inch long. Hook. fil. Fl. Brit. Ind. VI. 420.

Pahang: Tahan River (Ridley 5825); Kota Glanggi (Ridley 3156); Perak: Teluk Pinang, Kwala Dipang near Ipoh (Curtis 3352), Waterloo, Kamuning (Ridley). Woods local. Endemic.

D. HASTATA, Becc. Malesia III. 99. Hook. fil. l.c.c. Stems about 3 feet tall slender covered with leaf-sheaths ribbed and with black transverse fibres and usually with brown scurf. Leaves over a foot long, pedicel 4 inches long sheath 3 inches or more, leaflets 7 or 8 cuneate oblong or lanceolate acute or acuminate 5-6 inches long 2 inches wide often with petiolules as long as $\frac{1}{2}$ an inch. Inflorescence long and slender with 4 spathes on the peduncle narrow and close-fitting ribbed and scurfy, peduncle 5 inches long, spike 5 inches long male flowers, bud cylindric $\frac{3}{8}$ inch long, sepals short rounded; petals oblong, stamens 15, filaments very short, anthers long linear shorter than the petals. Female flowers small, sepals ovate. Pistil globose, stigma discoid. Drupe globular.

Singapore: Petaling (Ridley 10,342), Rawang (7886), Bukit Kudah (3155); Perak: (Wray 3537). Woods. Endemic.

11. CARYOTA, L.

Tall or medium unarmed palms, stoloniferous or not. Leaves very large and broad pinnatisect, leaflets very obliquely flabelliform or cuneate rounded or acuminate at the tip, petiolulate, with swollen bases of the petiolules. Inflorescences produced from the upper axils of the adult tree from the top downwards alternately male and female, the stem dying as the lowest are produced. Spathes short 3-5. Inflorescences much branched with long branches pendulous. Male flowers sepals orbicular, petals oblong, stamens numerous filaments very short, anthers linear. Female sepals rounded gibbous. Petals oblong or ovate. Staminodes 3. Stigma 3 lobed. Ovary 3 celled. Fruit globose 1-2 seeded. Seeds rounded elliptic. Albumen ruminate

Species about 10. India Cochin-China, Malaya and Australia.

Stem solitary very tall and stout ... ... 1. *C. obtusa.*
Stems several 15-25 feet slender ... ... 2. *C. mitis.*

1. C. OBTUSA, Griff. Calc. Journ. Nat. Hist. V. 480. Palm Brit Ind. 422. *C. obtusidentata* Griff. Palm. Brit. Ind. 236 A. B.

var. *æquatoriais*, Becc. Fl. Brit. Ind. V 423. Stem solitary about 60 feet tall and a foot or more through. Leaves 18 feet long, pinnules cuneate crenulate or serrate upper margin acute or acuminate. Inflorescence 12 feet long, spikes numerous 8 feet long. Male flowers pale yellowish green quaquaversal. Stamens more than 100. Females sepals broad rounded. Petals oblong acute. Fruit globose. Seed globose.

Johor: Gunong Panti (Ridley); Selangor: Pahang Track (Ridley); Perak: Gunong Batu Putih (Wray 1239), Larut Hills (Ridley 11,401). Abundant in the Larut Hills but very difficult to get specimens of, as tree when in flower is very tall.

2. C. MITIS, Lour. Fl. Cochinchinensis II. 569. Stems several 15 to 25 feet tall, 4 inches through or less. Leaves about 8 feet long sheaths covered with white mealy tomentum 3-4 feet long, petiole 2-3 feet, pinnae about 2 feet, leaflets cuneate erose toothed upper margin acute or not about 7 inches long, 9 to 15 on each pinna dark green. Spathes scurfy broadly ovate, obtuse, sheathing the inflorescence 10 inches long of 20 or more spikes. Male, sepals rounded green edges lacerate, petals oblong obtuse stiff pale violet purple ¼ inch long. Stamens numerous, filaments connate at the base. Anthers linear oblong yellow keeled, not minutely apiculate. Female flowers green. Sepals broad rounded gibbous edged with brown hairs. Petals ovate purple staminodes 3 very slender. Pistil obovoid. Fruit globular flattened ½ inch through fleshy purple. Seed 1 transversely elliptic shining wrinkled, albumen ruminate with a few transverse and vertical lines. Mart. Hist. Nat. Palm III. 195. Kunth. Enum. III. Hook. fil. l.c. 423. *C. sobolifera* Mart. l.c. III. 194, t. 107, f. 2. Griff. Calc. Journ. Nat. Hist. V. 481. Palm Brit. Ind. 171, t. 236. Miq. Fl. Ind. Bat. III. 41. Kurz. Fl. For. II. 530. *C. nana* Wall. Cat. 8595. *C. furfuracea* Bl. Mart. l.c. 195. Rumphia l.c. 138, t. 155. (partly). *C. Griffithii* Becc. Nuov. Giorn. Bot. Ital. III. 15.

Singapore: Bukit Timah (Ridley 1662, 1664, 1666), Tanglin (3150), Seletar (1660, 3149), Pulau Ubin (3148); Pahang: Pulau Tijau (Ridley 3147); Malacca: Ayer Panas (Goodenough 1551), Batang Malaka (Derry 201); Perak: (Wray 3744); Penang Hill (Ridley 2149); Provice Wellesley; Permatang Bertam. Distrib. Burmah, Andamans, Cochin-China. Native names "Tukus," "Dudok." The tomentum on the sheath is used by the Sakais as wadding for the blowpipe and tinder. The stem produces a kind of sago occasionally used by Malays.

3. NIPACEAE.

12. NIPA, Wurmb.

Tidal river plants. Stems very thick prostrate creeping ringed. Leaves very large pinnate leaflets narrow. Inflorescences subterminal on short peduncles covered with sheathing leaves. Male flowers in

catkins with setaceous bracteoles, very small. Sepals linear tips broad inflexed, petals similar smaller. Stamens 3, filaments short cuneate, anthers linear basifixed. Female flowers terminal in a capitulum, perianth lobes 6. Carpels 3. Stigma linear oblique. Ovules 3 erect. Fruit an enormous syncarp of obovoid compressed irregularly shaped carpels, with pyramidal angled tops, 1 celled and 1 seeded, pericarp fibrous, endocarp spongy. Seed erect grooved on one side, albumen soft lining the testa. Embryo basilar.

NIPA FRUTICANS, Wurmb. Verh. Bat. Genootsch. I. 349. Creeping stem fleshy two feet or more through. Leaves 15-20 feet tall dark green, glaucescent beneath, leaflets. Inflorescence large on a long peduncle. Bracts orange. Male spikes 2 inches long. Fruit about 2 feet through, dark brown.

Blume, Rumphia III. 76, pl. 164, 165. Mart. Hist. Nat. Palm III. 305, t. 208. Lam. Ill. t. 89, 7. Labill. Men. Mus. Par. V. t. 21, 22. Gaud. Voy. Bonit. t. 67. Kth. Enum. III. 110, 589. Miq. Fl. Ind. Bat. III. 170. Griff. Notul. III. 168. Ic. Pl. As. 244. Roxb. Fl. Ind. III. 650. Hook. fil. Fl. Brit. Ind. VI. 424.

Tidal rivers over the whole peninsula also occurring in the Sunderbunds, Ceylon, Malay Islands and Australia. Fossil fruits of a very similar species occur in the London Clay in England. Native name "Nipah." The leaflets of unopened leaves are used for cigarette papers, and the albumen of the fruit is eaten. The leaves are used for the manufacture of ataps and are considered among the best for this purpose. In some places the plant is being planted for this purpose.

4. PHOENICEAE.

13. PHOENIX, L.

Palms unisexual with short rarely tall stems, simple or tufted. Leaves pinnate stiff, spiny, leaflets linear or lanceolate acute pungent, sides folded in at base. Inflorescences interfoliar, erect, branched, spathe complete coriaceous large. Flowers small yellow. Male calyx flat or cup-shaped 3 lobed. Petals linear ovate, or oblong. Stamens 3-9, filaments subulate, anthers dorsifixed. Pistillode minute or wanting. Female flowers, sepals as in male. Petals rounded, longer. Staminodes 6 or connate into a cup. Carpels 3 free, stigmas sessile, Ovules erect. Drupe 1 seeded oblong, stigma terminal, pericarp fleshy, endocarp membranous. Seed oblong ventrally grooved, albumen equable or slightly ruminate.

Species 10 or more. African, Indian, Siam, and Malay Peninsula.

P. PALUDOSA Roxb. Hort. Beng. 75 Fl. Ind. 789. Stems several 5 to 8 feet tall and 3 inches through ringed. Leaves 4-8 feet long, petiole spiny, leaflets 12-24 inches long ½ inch wide linear acuminate grey beneath. Male inflorescence 1-1½ feet long, peduncle broad and flat, branches slender sinuate 3-4 inches long spreading. Flowers

¼ inch long. Calyx very short, flat lobes flat rounded. Petals very much longer linear ribbed. Stamens shorter slender. Female inflorescence stouter branches whorled and scattered 5-9 inches long flowers scattered. Calyx lobes rounded. Petals orbicular twice as long. Staminodes 6. Drupe ½ inch long black seed elliptic grooved ⅜ inch long ¼ inch thick. Mart. Hist. Nat. Palm III. 272, 320 t 136. Kunth. Enum. III. 256. Griff. Calc Journ. Nat. Hist. V 353. Palms Brit. Ind. 144, t. 229. A.B. Hook. fil. Fl. Brit. Ind. VI 427. *P. siamensis* Miq. Palm Arch. Ind. 14.

Dindings: Lumut (Ridley); Province Wellesley: Prai, Krian; Kedah: Yan (Ridley). Distrib. India, Siam, Andamans. Inhabits tidal swamps. Native name "Korma."

5. CORYPHEAE.

14. LICUALA.

Palms with solitary or several stems from a few inches to 15 feet tall. Leaves cuneate or orbicular plicate deeply cut into cuneate segments, petiole spinous. Inflorescence interfoliar, elongate with tubular appressed sheaths, spathes. Spikes simple or compound from the axils of the sheaths, short many flowered glabrous or tomentose or scurfy. Flowers small hermaphrodite, scattered. Calyx cupular or 3 toothed. Petals connate base ovate. Stamens 6 filaments free or connate in a ring. Ovary 3 carpels free or connate. Styles filiform Drupe small globose or ellipsoid, style terminal. Seed globose albumen

Species about 50. India, Malaya, Australia, Australia, Polynesia.

Stem tall. Leaves large. Inflorescence elongate spikes.

Calyx campanulate not lobed	1. *L. paludosa.*
Calyx cylindric 3 lobed pubescent ...	2. *L. spinosa.*
Calyx urnshaped three toothed	3. *L. glabra.*
Calyx urnshaped not lobed	4. *L. longepedunculata.*
Calyx cylindric not lobed	5. *L. Malayana.*
Stemless with large leaves and stout inflorescence.	
Leaflets 10-13. Calyx cupshaped ...	6. *L. ferruginea.*
Leaflets 20. Calyx cylindric	7. *L. longipes.*
Inflorescence short and slender.	
Flowers pedicellate. Calyx broad campanulate	8. *L. Kunstleri.*
Flowers sessile. Calyx short lobes broad	9. *L. acutifida.*
Flowers sessile. Calyx cylindric lobes small	10. *L. modesta.*
Small palms, leaves small. Inflorescence of 2 or 3 slender branches	

Leaflets 3-7 median one petioled, cuneate	11. *L. triphylla.*
Leaflets 11-16 all sessile, linear. Calyx sessile	12. *L. pusilla.*
Leaflets 10-17 sessile. Calyx pedicelate	13. *L. Scortechinii.*
Small palms. Inflorescence of 1-3 woolly branches.	
Spikes single	14. *L. Kingiana.*
Branches 2-3	15. *L. lanuginosa.*
§ PERICYCLUS, Inflorescence lax panicled ...	16. *L. paniculata.*

1. L. PALUDOSA, Griff. Calc. Journ. Nat. Hist. V. 233. Palms of British India t. 221. Stems several 10-20 feet tall 2-3 inches through. Leaves numerous, petiole armed at base with short sharp thorns, blade orbicular 7-9 partite, lobes 2 feet long 4 inches wide or less bluntly toothed. Inflorescence 3-6 feet long, sheaths stout 6 inches or more long sparingly scurfy almost entire. Panicles 6-8 inches long with 6 or 8 branches, rachis rather thick slightly pubescent. Flowers scattered very short turbinate. Calyx campanulate irregularly split at the top $\frac{1}{16}$ inch long nearly glabrous. Corolla lobes short ovate glabrous. Staminal crown adnate to petals, anthers oblong. Fruit globose small $\frac{1}{4}$ inch through, red. Becc. Males. III. 74. Hook. fil. l.c. 430.

Johor: Hadji Senawi near Batu Pahat (Ridley 11212); Malacca: Tanjong Kling, Pulau Besar (Griffith); Muar: Sungei Segal (Fox); Dindings: Lumut (Ridley 10,329); Perak: (Scortechini), (King's Coll. 7339, 8534), Gunong Bubu at 4000 feet (Wray 3928).

Swampy woods usually in the low country. Endemic.

2. L. SPINOSA, Wurmb. Verh. Genootsch. II. 469. Stems several 5 to 15 feet tall grey ringed 2 inches through. Leaf orbicular, petiole about 3 feet long, thorny for its whole length, thorns strong black, leaflets 18 linear cuneate over 12 inches long $1\frac{1}{2}$ inch across apex erose. Inflorescence erect 4-6 feet long, sheaths close fitting, mouths lanceolate upper part silvery scurfy 13 inches long, panicles several 2-3 branched, brown hairy. Flowers $\frac{1}{8}$ inch long. Calyx cylindric hairy lobes ovate. Corolla lobes white pubescent ovate lanceolate acute. Staminal ring obscurely lobed. Drupes oblong or subglobose $\frac{1}{4}$ inch long, orange, pericarp fleshy, seed globular. Griff. Calc. Journ. Nat. Hist. V. 321, Palm. Brit. Ind. 119, Bl. Rumphia II. 39, t. 82, 88. Mart. Hist. Nat. Palm. III. 235, t. 135, 1, 2. Becc. Males. III. 74, Hook. fil. Fl. Brit. Ind. V. 431. *L. paludosa* Kurz. Journ. As. Soc. Beng. XLIII. 528. For. Fl. II. 258, (not Griffith). *L. ramosa* Bl. Schult. Syst. VI. 1303, Rumph. II. 32.

Singapore: Sepoy Lines, Pulo Brani (Ridley 5121), Pulau Ubin (Ridley 3166); Johor: Pulau Tinggi (Feilding); Malacca: (Griffith) Pringgit and elsewhere round the town; Pahang: Pekan (Ridley); Perak: Matang Lumbu (Wray 2527); Lankawi, Kwah (Curtis 3419)

Distrib. Andamans. In damp or dry open country in the plains. Common.

3. L. GLABRA, Griff. Calc. Journ. Nat. Hist. V. 329. Palm. Brit. Ind. 124, t. 223. Hook. fil. l.c. 432. Stem stout 1-5 feet tall about 1½-2 inches through. Leaves fan-shaped, large 16-18 lobed, petiole rather slender over a foot long, thorns at the base only, close together stout with decurved points, leaflets linear cuneate, middle one often much broader slightly erose, the others deeply erose with a point at each side, one larger than the other. Inflorescence over 5 feet long slender lowest sheath broad flattened 8 inches long, upper ones 3-1 inch long narrow close fitting, branches about 7, 2-6-partite glabrous from 5 to 1 inch long. Flowers not crowded, on rounded bosses, with a short thick lip. Calyx urn-shaped 3 toothed, petals lanceolate subobtuse. Drupe ellipsoid ⅜ inch long.

Malacca: Mount Ophir (Griffith, Ridley 3743), (Hullett 852); Selangor: Bukit Kutu (7894), Bukit Hitam (Kelsall); Pahang: Tahan Woods (Ridley); Perak: Lumut (Ridley).

In the hillwoods to about 3000 feet local but abundant. "Palas Gunong."

4. L. LONGEPEDUNCULATA, Ridl. Journ. Roy. As. Soc. Vol. 41 p. 42. Stem 3 to 8 feet long 1-1½ inch through. Leaves 4-5 feet long lobes 6 or more narrowed at the base and broadened upwards with broad blunt teeth, 15 to 18 inches long 3 inches wide at the top, deep green, petiole slender not spiny. Inflorescence slender 3 feet or more long peduncle broad flattened at the base quite glabrous over 2 feet long, sheaths distant long. Spikes 3 inches long, 4 together. Flowers scattered ⅛ inch long rachis moderately stout. Calyx urn-shaped sessile not lobed, petals lanceolate acute, obtuse.

Perak: Gunong Batu Putih (Wray 254) (King's Coll. 8148). Beccari labels this "L. glabra foliis latioribus." Endemic.

5. L. MALAYANA, Becc. Males. III. 197. Hook. fil. Fl. Brit. Ind. l.c. 2131. Stem tufted 6 to 7 feet tall nearly 2 inches through. Leaves nearly orbicular lobes about 14-26 linear cuneate median not much broader than the others, teeth short or moderately long on the lateral lobes, 15 inches long, 1-2 inches wide, petiole rather slender over two feet long sub-triquetrous edges not sharp thorny for the lower third only, thorns rather stout curved or horizontal. Inflorescence slender 2 feet long branches all simple moderately thick 4 inches long. Spathes narrow limb not lacerate. Rachis pubescent or almost glabrous. Flowers rather scattered solitary on short tubercles, with a small ovate bract. Calyx cylindric, base intruded, lobes very obscure, glabrous or pubescent, splitting irregularly as the flower expands. Petals lanceate thick grooved on the inner surface. Staminal tube not deeply lobed. Style cylindric, ovary often 3 lobed. Fruit globose.

Pahang : Tanjong Antan, Pulau Changei (Ridley); Perak : Bujong Malacca (Ridley), Box Hill, Larut Hills (Fox), Goping (King's Coll. 469, 8127), Salak (Scortechini 5267). Hill forests to about 4000 feet altitude. Endemic.

6. L. FERRUGINEA, Becc. Flor. Brit. Ind. 432. Stem very short, practically none. Leaves about 10 on a plant petiole stout over 3 feet long, thorny at the base only thorns small, leaflets 10 to 13 very variable in width ribbed stiff dark green, apex erose with blunt teeth. Central leaflet much the largest, 3 feet long 1 to 9 inches wide at the apex. Inflorescence deflexed or horizontal 2 feet long with simple branches. Spathes brown pubescent slightly silvery 4 inches long mouth lacerate rachis thick covered with red tomentum. Flowers crowded sessile more rarely almost pedicelled. Calyx short cup-shaped 3 lobed, lobes ovate pubescent. Petals triangular yellow. Staminal crown half the height of the petals not lobed, anthers six very small, ovary often bilobed. Drupe ellipsoid bright rose pink.

Singapore: very common Garden Jungle (Ridley 3168). Bukit Timah (Ridley 3512). Ang Mo Kio (Ridley 6676); Selangor: Caves, Kwala Lumpur (Ridley); Johor: Tebrau (Ridley); Kedah: Yan (Ridley).

A very distinct kind remarkable for the thick spadix covered with red wool and dense mass of pink fruits. Woods in the low country. Endemic.

7. L. LONGIPES, Griff. Calc. Journ. Nat. Hist. V. 330. Palm. Brit. Ind. 125. t. 224. A.B. (Kurz. Journ. As. Soc. Beng. XLIII. 204. Flor. For. II. 528. Hook. fil. l.c. 431). Stemless or almost so. Leaves large orbicular in outline petiole over a foot long broad and stout, thorny for two-thirds of its length, thorns stout, leaflets deep green 14-18 inches long, 3-4 inches broad at the apex cuneate erose crenulate, about 8-20. Spadix about 5-12-24 inches long stout, spathes dilate broadly toothed at the apex, 3 inches long. Branches stout 3 inches long spreading, 5 or 6 on a common peduncle. Flowers crowded $\frac{1}{8}$ inch long. Calyx cylindric with a broad base, lobes short ovate. Corolla lobes short ovate. Fruit globose $\frac{1}{2}$ inch through. Seed globular as large as a pea. Woods in the hills common.

Johor : Gunong Pulai, Gunong Panti (Ridley); Malacca : Ayer Panas (Goodenough 1406) lower slopes of Ophir Range (Griffith); Negri Sembilan : Tampin (Goodenough 1962), Gunong Angsi (10121) (Ridley 10120, 3474); Selangor: Pahang Track; Perak, Maxwell's Hill.

8. L. KUNSTLERI, Becc. Fl. Brit. Ind. l.c. 433. Stem "4 feet tall by 4-5 inches diameter." Leaf large about 15 lobes, about 18 inches long and over an inch wide, median much larger, apex broad but little erose, lateral lobes with one or more long teeth, petiole slender 3 feet long triangular in section, thorny for about two-thirds its length, thorns rather long decurved. Inflorescence a foot long, branches three spikes

single, spathes silvery scurfy, lowest 4 inches long lacerate, upper ones shorter dilate, tips white hairy, rachis brown tomentose. Flowers pedicellate, pedicel $\frac{1}{16}$ inch long tomentose nearly as long as the flower. Calyx short broad campanulate with 3 broad sub-obtuse lobes. Corolla short, petals lanceolate short acute. Staminal ring 6 lobed. Pahang: Tanjong Antan (Ridley); Perak: Ulu Bubong (Kunstler 10205). Rare. Endemic.

9. L. ACUTIFIDA, Mart. Hist. Nat. Palm III. 236, t. 135, f. 3-4. Griff. Calc. Journ Nat. Hist. V. 327, Palms Brit. Ind. 122, t. 222, A. B. Wall. Cat. 8618. Hook. fil. Fl. Brit. Ind. l.c. 433. Stem usually very short. Leaf semi-circular, lobes 15 to 20 narrow linear 3-nerved apex 3-toothed teeth rather large blunt 12 inches long $\frac{3}{4}$ inch wide, median one not much larger, petiole slender back rounded edges sharp, $2\frac{1}{2}$ feet long, thorny at the base only, thorns small sharp and black. Inflorescence 15 inches long branches about 4 with 1 or 2 spikes 3 to 5 inches long all silvery pubescent. Spathes shortly split silvery scurfy pubescent, upper ones dilated upwards, lowest 4 inches long. Flowers small on a small boss. Calyx short with 3 broad ovate lobes longer than the tube deeply separate pubescent. Petals lanceolate acuminate pubescent. Drupe very small orange. "Palas Padi."

Penang: Hill (Ridley 7906); Malacca: Sungei Hudang (Goodenough 13601). Endemic.

10. L. MODESTA, Becc. Males. III. 195. Hook. fil. l.c. 433. Stem 2-10 feet. Leaf semi-circular lobes about 13, cuneate apex broad bluntly 3 to 6 toothed, 7 to 13 inches long, $\frac{1}{2}$ to $\frac{3}{4}$ inch wide, terminal much broader, petiole long nearly 2 feet slender back rounded edges sharp thorns only at the base very few and small. Inflorescence 2 feet long or less, peduncle flattened, branches about 3, with 1 to 4 dense-flowered spikes 2 to 6 inches long. Spathes narrow deeply cleft on one side papery, apex obtuse toothed, lowest one about 6 inches long covered with silvery scurf. Rachis tomentose or thickly woolly. Flowers sessile tomentose $\frac{1}{8}$ inch long. Calyx cylindric cup-shaped pubescent shortly 6 toothed. Petals short lanceolate pubescent. Staminal tube 6 lobed. Style cylindric. Drupe "globosely obovoid about $\frac{1}{2}$ inch long pedicelled by the calyx."

Perak: Kwala Kangsar (Ridley 3167), Larut Hills (Curtis 3529) (King's Coll. 3243, 2420, 1983, 1951, 1945).

This is distinguished from *L. acutifida* by its broader leaflets stouter spikes and small sepals. Forests to 5000 feet. Endemic.

11. L. TRIPHYLLA, Griff. Calc. Journ. Nat. Hist. V. 352. Palms British India 126, t. 225. Hook. fil. Fl. Brit. Ind. l.c. 432. Almost stemless, with but few leaves. Leaves with a strong net-work at the base, petioles slender 15 inches long, thorns few and small at the base only, leaflets 3 to 7 cuneate broadly crenate at the top, lateral ones

erose with the upper margin prolonged, central one broader barely erose 8 inches long. Inflorescence slender short 8 inches or less branches about 6, ½ to 1 inch long. Spathes short thin about an inch long. Flowers minute few about 12 in a spike scattered almost sessile on a rachis covered with red tomentum. Sepals ovate acute green tomentose; petals longer white staminal crown short, filaments filiform very short, anthers white, ovary 3 lobed pubescent flattened at the top. Drupe pea-shaped small red. Woods. "Palas Rewang," "Gurcheng," "Palas Tikus."

Singapore: Changi (Ridley); Johor: Panchur; Malacca: Chabau, Ayer Panas (Griffith), (Goodenough 1628); Muar: (Fox 11301); Pahang: Tahan River (Ridley); Negri Sembilan: Gunong Angsi; Perak: Dindings at Gunong Tungul (Ridley).

var. *integrifolia*. Plant very small not 12 inches tall leaves entire cuneate ovate crenulate 4 inches long by 2 wide, petiole 2 inches long thornless. Spadix 3 inches. A dwarf form. Pahang, Lubok Pelang (Ridley).

The smallest species in the genus. Endemic.

12. L. PUSILLA, Becc. Malesia III. 194. A dwarf palm, stem 6 inches or less long. Leaves several, petioles slender 18 inches long, thorny for half its length or less ¼ inch through, leaflets 11 to 16, narrow linear narrowed at the base, the three median ones connate at the base, 9 inches long by ¾ inch wide, tips truncate with short broad blunt teeth, the side leaflets with 2 or 3 blunt teeth and one longer acuminate one, dark green. Inflorescence very slender 9 to 18 inches long, sheaths 2 flattened narrow. Spikes very slender 1½ inch long simple or the lower ones 2 to 3 branches pubescent. Flowers under ⅛ inch long. Calyx companulate narrowed at the base irregularly split at the mouth pubescent. Corolla lobes ovate acute pubescent. Fruit as large as a pea red. Hook. fil. Fl. Brit. Ind. VI. 433.

Perak: Sunki (King's Coll. 3028), Ulu Bubong (King's Coll. 10213), Larut Hills at 2500 feet elevation (Ridley 11406), (Scortechini 531b); Pahang: Tahan River Woods (Ridley).

This is very near L. *nana*, Bl. of Sumatra, but that has a much longer inflorescence.

13. L. SCORTECHINI, Becc. Males. III. 192. Hook. fil. Fl. Brit. Ind. l.c. 434. Leaves semi-circular with 12 to 17 lobes, petiole slender 18 inches long with a few thorns at the base, leaflets 6 inches long linear cuneate with broad bifid teeth and raised nerves. Inflorescence 18 inches or less slender, branches 1 or 2 pubescent 4 to 6 inches long. Spathes lowest oblong linear apex rounded with a small cusp papery brown upper ones with a rather long free limb. Calyx obconic cup-shaped shortly stalked pubescent with 6 obscure teeth. Petals lanceolate acute pubescent. Staminal ring 6-toothed teeth very short broad at base, subulate.

Perak: (Scortechini); Kedah: Gunong Jerai (Ridl. 5201). Endemic.

14. L. KINGIANA, Becc. Males. III. 193. Fl. Brit. Ind. l.c. 434. Stem 5 feet by 1 inch diameter. Leaves semi-circular about 7 lobed, lobes broad cuneate margin rather deeply toothed bases narrowed almost petioluled, 6 to 10 inches long 1½ inch wide, petiole 6 inches to 2 feet long slender back rounded edges not sharp, thorny only at the base, thorns horizontal black. Inflorescence 8 inches long with 1 or 2 dense erect spikes silvery woolly. Spathes 2 or 3, 4 inches long or less split on one side glabrous apex cuspidate, rachis stout woolly. Flowers numerous crowded sessile. Calyx cup-shaped somewhat globose irregularly split into sharp pointed segments covered with shining hairs. Petals short ovate silvery. Staminal ring with 6 teeth base very broad apex subulate, ovary turbinate.

Perak: Bujong Malacca (Curtis 3162), Gunong Keledang (Ridley 9804), Goping (Kunstler 471), Bukit Kapayung, Sungei Siput (Ridley 1969. Very distinct in its globose woolly buds. The spadix is occasionally branched. Endemic.

15. L. LANUGINOSA, Journ. Roy. As. Soc. S. Br. Vol. 44, p. 203. Stem short, leaf 6-11 lobed, lobes linear stiff with short broad teeth, 13-24 inches long by 1-1½ inch broad, 3 or more ribs on each; stout bluntly 3 angled ¼ inch through and over 1 foot long, thorny for about half its length, thorns conic short brown. Inflorescence 1 foot long thick covered with silvery wool, branches 2 or 3 with a short thick peduncle, spikes stout 2 inches long thick woolly. Spathes silvery woolly lacerate. Flowers numerous sessile ⅛ inch long globose. Calyx broadly cylindric shortly 6 lobed covered with dense shining hairs. Petals little longer ovate lanceolate silky. Staminal cup 6 lobed. Drupe globose ½ inch through red.

Johor: Gunong Pulai, Gunong Panti (Ridley, 12198). Near *L. Kingiana* but flowers larger.

16. L. (PERICYCLUS) PANICULATA, Ridl. Journ. Roy. As. Soc. S. Br. 41, p. 42. Leaf large lobes 2½ feet long rather narrow with short teeth ¼ inch broad. Inflorescence panicle divide spreading 3 feet long, spathes 6 not split, lowest 8 inches long ½ inch wide, upper reddish, upper ones shorter dilated upwards. Branches panicled, spikes long and slender 5-7 glabrous or slightly scurfy 7 inches or less long. Flowers scattered sessile ⅛ inch long. Calyx cylindric, base broad truncate obscurely and irregularly lobed glabrous. Petals ovate short broad acute. Staminal ring with 6 teeth. Pistil sometimes 2 lobed, style lateral.

Perak, Hermitage Hill (Ridley).

This plant is evidently allied to *L. pericycla*, *Pericycla penduliflora* Bl. a native of New Guinea but that has the flowers in pairs on stalks. Endemic. Rare.

15. LIVISTONA, Br.

Tall palms with a stout trunk. Leaves large orbicular, plicate split about half way into narrow lobes, petiole long thorny on the edge. Inflorescence very large with a long peduncle much branched. Spathes numerous tubular. Flowers minute, bisexual. Calyx cup-shaped with 3 lobes. Corolla lobes valvate 3. Stamens 6 connate at the base in a ring. Anthers cordate ovary of 3 nearly free carpels. Styles short free or connate. Stigmas minute. Ovules basilar erect. Drupes elliptic or globose. Seed erect ventral surface hollowed. Albumen equable.

Species 16. Assam, Siam, Malayan and Australian.

Stem 60 feet tall smooth ... ... 1. *L. cochin-chinensis.*
Stem 3 feet long covered with brown fibre 2. *L. rupicola.*

1. L. COCHIN-CHINENSIS, Mart. Hist. Nat. Palm. III. 242. Stem 60 feet tall or more smooth. Leaves orbicular 10 feet across, lobes bifid long narrow acuminate, tips filiform pendulous petiole long 2 inches through at the base 1 inch through near the blade, thorns at base very large recurved thick ½ inch long. Inflorescence 4-5 feet long, much branched, branches thick 12 inches or more long much divided. Flowers very small sessile. Calyx minute cup-shaped with a broad base with 3 rounded teeth. Corolla lobes broad. Stamens connate with the corolla tube. Carpels adhering by their styles. Drupe globular light blue ½ inch long seed globose. Becc. Males. III. 69. Hook. fil. Fl. Brit. Ind. VI. 434. *L. spectabilis* Griff. Calc. Journ. Nat. Hist. V. 336. Palms Brit. Ind. 130, t. 226. B.C. *Corypha saribus* Lour. Fl. Cochin-ch. I. 212. *Saribus Cochin-chinensis* Bl. Rumphia II. 49.

Malacca: (Griffith); Province Wellesley: Permatang Bertam (Ridley); Penang: (Lewes); Selangor: Jugra (Burn-Murdoch) (Herb. H. Sing. 11352). Distrib. Cochin-china.

In swampy woods and rice fields. Native name "Serdang."

2. L. RUPICOLA, Ridl. Journ. Roy. As. Soc. S. Br. 41, p. 41. Stem short and thick about 3 feet long and 6 inches through densely covered with brown fibre. Leaves about 2 feet across with about 12 leaflets rather narrow very acuminate apex setaceous, petiole slender shining 20 inches long nearly? thornless. Spadix slender much branched, spathes split striate cuspidate dark brown, 2 basal ones 3 inches long, upper ones slightly dilate cuspidate, branches many long slender with many very long and slender sinuous spikes 2 inches long in flower lengthening to 4 in fruit. Bracts at base of branches linear narrow caducous. Flowers very small globose. Sepals rounded gibbous petals similar. Staminal crown with 6 subulate teeth.

Selangor: Limestone Rocks, Kwala Lumpur Caves (8285); Lankawi (Curtis).

Most peculiar from its thick stem densely covered with fibre. Native name "Serdang Batu."

16. PHOLIDOCARPA, Nl.

Lofty palms with a stout stem and fan-shaped leaves with a stout thorny petiole. Inflorescence very large and stout, on a stout peduncle, with a large panicle of sessile flowers, bisexual. Calyx tubular with free points, corolla twice as long. Stamens 6, connate at the base. Pistil conic. Drupe large globose, pericarp fleshy or testaceous seed large globose ruminate. Species several Malayan.

P. MACROCARPA, Becc. Males. 91. Stem stout and tall about 50 feet. Leaves fan-shaped very large 5 or 6 partite, petiole thorny to the top. Spadix very stout 5 feet long, 1½ inch through at the base with about 8 branches, bearing numerous branchlets, branches about a foot long an inch thick at the base flattened, woody. Spathes tubular closely clasping dark brown, covered with a light brown scurf, limb acuminate. Flowers spirally arranged rather distant. Fruit ovoid 6 inches long 4 inches through on short stout pedicels ¼ inch long, brown tessellated. Damp woods "Kepau."

Selangor: Batu Tiga Petaling (Ridley).

The fruits vary very much in size and form, and it may be doubted whether *P. mucronata* Becc., *P. mayadum* Becc., *P. sumatrana* Becc., and even *P. Ihur* Bl. are distinct.

2. PH. KINGIANA, Ridl. Stem solitary 40 to 80 feet tall very stout and hard about 8 inches to 12 through rough with the old leaf basis, above covered with a brown fibrous rete. Leaves very large fan-shaped orbicular stiff 3 to 5 feet across cut to the base into longlinear acuminate points, 3 inches wide petiole 6-7 feet long 1 inch through, back rounded with strong conic forms with a swollen black base green with 2 longitudinal yellow bands. Inflorescence very large and stout peduncle thick covered with several tubular sheaths dilated upwards dark orange brown. Branches panicled over a foot long, numerous branchlets slender 4-5 inches long. Flowers scattered sessile, ¼ inch long yellow. Calyx tubular with lanceolate triangular points edges ciliate. Corolla lobes twice as long broad blunt pubescent. Stamens 6 filaments broadly quadrate at the base abruptly narrowed above subconnate at base, anthers small elliptic. Pistil conic pubescent above style cylindric. Drupe globular with a lateral groove 2 inches through dark green with scattered warty spots, pericarp fleshy ½ inch thick green passing into orange inside. Seed globular tessellate 1 inch through, albumen sub-ruminate. *Livistona Kingiana* Becc. Males. III. 199. Hook. fil. Fl. Brit. Ind. VI. 435.

Singapore: Bukit Mandai, Chua Chu Kang (Ridley); Johor: Batu Pahat (Machado Herb. H. Sing. No. 11351); Selangor: common, Jugra

(Burn-Murdoch Herb. H. Sing. 11350); Dindings: Lumut (Ridley); Perak: (Kunstler 3904).

Damp woods. Native name "Kepau."

17. Teysmannia, Miq.

A palm with a short or moderately tall stem. Leaves very large cuneate paddle-shaped entire with broad notches at the top, petiole long thorny at the base. Inflorescence short decurved with a few stout branches. Spathes several. Flowers pedicelled sepals short rounded petals much longer lanceolate. Stamens 6 connate in a ring. Fruit 1-seeded pericarp covered with corkey warts. Seed globular.

T. altifrons, Miq. Mus. Lugd. Bat. IV. 89. I. II. III. Stem very short to 6 or 7 feet tall stout brown. Leaves erect very large blade 6 or 7 feet long, 20-24 inches wide, bright green, stiff coriaceous plicate, petiole 24 to 30 inches long. Spathes several brown furfuraceous narrow 6 inches or less long 1 inch across oblong. Inflorescence short, woody decurved, with 6 or 7 stout branches 6 inches long covered with reddish fur. Flowers pedicelled shortly, sepals short broad rounded, petals $\frac{1}{8}$ inch long equal lanceolate, stamens 6 in a ring. Fruit subglobose corkey and warted $1\frac{1}{2}$ inch through brown. Seed globose $\frac{3}{4}$ inch through.

Pahang: Tahan Valley (Ridley); Perak: Gunong Keledang (Ridley), Bukit Kapayung, Sungei Siput (Machado); Negri Sembilan: Bukit Tanga, Seremban (Napier).

A grand palm very difficult to cultivate. The leaves are used for attaps and exceedingly good for this purpose. It occurs in woods and is know as "Daun Sang" and "Daun Payong." Distrib. Sumatra.

Lepidocaryeae.

18. Zalacca, Bl.

Short stemmed, or almost stemless palms with long thorny pinnate leaves, leaflets linear or lanceolate numerous. Inflorescence from among the leaves usually short compact, unisexual, with many short stout spikes. Males spikes cylindric, dense covered with short cupular bracteoles, usually woolly. Calyx tubular 3 lobed or lobes free to the base. Corolla lobes longer. Stamens 6 free, anthers small. Females larger similar, staminodes 3 to 6 or 0. Ovary 3-celled styles recurved. Drupe large ovoid, covered with brown yellow scales. Seeds 1-3 enclosed in acid pulp erect, testa hard, albumen aequable.

Species 9 or 10. Assam and Burma, Malaya. The Salak, *Z. edulis* Bl. is cultivated in Java and its fruits commonly imported into Singapore for sale.

Leaflets linear ensiform ... ... 1. *Z. conferta.*

Leaflets oblong falcate.
Inflorescence compact ... ... 2. *Z. affinis.*
Inflorescence elongate trailing spikes much longer than the spathes ... 3. *Z. glabrescens.*
Leaflets elliptic acuminate at both ends.
Inflorescence very long trailing spikes shorter than the spathes ... ... 4. *Z. Wallichiana.*

1. Z. CONFERTA, Griff. Calc. Journ. Nat. Hist. V. 16, Palms Brit. Ind. 19, t. 180 A.B.C. Stem hardly any, leaves about 15 feet, petiole about half its length spiny rachis stout with long slender spines in short rows, leaflets rather distant linear ensiform. Inflorescence compact much branched, spikes distichous. Spathes numerous short ovate acute ribbed. Spikes stout 4-5 inches long. Flowers in pairs in short broad ribbed bracteoles, 1 male and 1 female, subsimilar $\frac{1}{4}$ inch long, calyx lobes linear oblong free to the base, petals nearly twice as long oblong ribbed. Stamens narrow linear shorter than petals. Female pistil ovoid styles recurved rather thick. Drupe rounded obovoid yellow over 1 inch long, with a small mammilla at the apex scales smooth polished subtriangular but very irregular, grooved. Pulp acid. Mart. Hist. Nat. Palm. III. 201, t. 137, 174. Becc. Males. III. 67. Hook. fil. Fl. Brit. Ind. VI. 473.

Singapore: Tanglin, Bukit Timah, Bukit Mandai, etc.; Malacca; Selangor: Kwala Lumpur; Perak; Dindings: Lumut. Distrib. Borneo, Rhio, etc.

Very common in wet woods forming impenetrable thickets in water. The fruit intensely acid is eaten by Malays and known as "Asam Paya" and "Kelubi."

The bracteoles are slightly fluffy inside at the base less so than in most species.

2. Z. AFFINIS, Griff. Calc. Journ. Nat. Hist. V. 9. Palms Brit. India 12, t. 176. Stem short stout. Leaves numerous about 12 feet long strongly spiny rachis stout obscurely 3 ribbed, leaflets oblong falcate very broad over 12 inches long 3 inches wide with three stout ribs, dark green. Inflorescence 13 inches long compact, with numerous spikes. Spathes lanceolate acuminate split 5 inches long by $\frac{1}{2}$ wide or less. Male spikes crowded cylindric fluffy an inch long. Bracteoles small obovate with brown fluffy fibres. Flowers $\frac{3}{16}$ inch long, calyx lobes oblong ribbed split to base. Petals twice as long oblong cuspidate strongly ribbed. Stamens 6. Anthers short elliptic. Female spadix broad flattened 9 inches long. Spathes much shorter than the branches. Spikes stout 3-5 inches long $\frac{1}{2}$ inch through. Bracteoles broad ribbed glabrous. Flowers $\frac{1}{4}$ inch long much larger than the males. Calyx lobes lanceolate oblong strongly ribbed. Petals elliptic lanceolate strongly ribbed half as long again. Pistil scaly, stigmas

recurved. Fruit nearly 3 inches long turbinate beaked very dark brown longitudinally grooved, scales numerous cuneate blunt deeply grooved $\frac{1}{8}$ inch long. Hook. fil. Fl. Brit. Ind. VI. 472.

Singapore: Bukit Timah, Chan Chu Kang; Malacca: Batu Tiga (Ridley 1419); Dindings: Gunong Tungul (Ridley); Larut (King's Collector). Wet spots in forests "Salak Hutan."

3. Z. GLABRESCENS, Griff. Calc. Nat. Hist. V. 14. Palms Brit. Ind. 17, t. 179. Stem none. Leaves 12 to 15 feet very spiny, spines broad flat in short horizontal rows, leaflets close set oblong falcate acuminate subulate apex setulose 8-12 inches long 2 wide with 3 ribs on each dark green, uppermost pair connate with many teeth. Spadices long slender branched trailing, one foot or more long covered with tubular spathe with a lanceolate limb. Young spikes cylindric brown covered with very crowded broad and short bracteoles, giving them an appearance of being ringed. Male flowers rather smaller than females Females $\frac{3}{8}$ inch long. Calyx lobes broad lanceolate obtuse free about half way down. Corolla ovate lanceolate falcate lobes lanceolate obtuse, very stiff little longer than calyx. Pistil densely covered with long whitish hairs or bristles. Fruit fusiform globose narrowed into a deep an inch long. Scales in vertical rows small $\frac{1}{16}$ inch long dark brown ending in up-curved points margins irregular. Seeds 2 separated by a transverse partition, inner face flat outer rounded. Hook. fil. Fl. Brit. Ind. VI. 473.

Selangor: Kwala Lumpur, Ulu Selangor; Penang Hill, Road to Balik Pulau (Curtis); Pahang: Tahan River Woods.

4. Z. WALLICHIANA, Mart. Hist. Nat. Palm. III. 200, 325, t. 118, 119. Stems short and stout. Leaves 8 to 20 feet long, rachis stout armed with long flattened thorns 2-3 together, leaflets elliptic acuminate at both ends clustered in groups of 2 to 4 dark green, apices setaceous, margins setulose nerves 3 prominent, and 9 secondary, 12 to inches long 3 inches wide. Male inflorescence 4 feet long, peduncle over 2 feet rather slender with 3 empty sheaths, spathes lanceolate split 4 inches villous. Spikes about 7 distant $2\frac{1}{2}$ to 3 inches long cylindric blunt, shortly peduncled. Bracteoles ovate short ribbed. Flowers $\frac{1}{4}$ inch long. Calyx lobes linear lanceolate free to the base. Corolla half as long again lobes linear obtuse. Stamens with short oblong anthers. Fruit obovoid in dense heads, brown scales with long reflexed brittle points, 1-3 celled, 1 inch long. Kurz. Flor. For. II. 511. 66. *Z. edulis* Wall. Pl. As. Rar. III. 14, t. 222-224, (not of Blume) *Z. Rumphii* Griff. Calc. Journ. Nat. Hist. V. 8. Palm. Brit. Ind. 10, t. 175. Bl. Rumphia II. 159. Z. *macrostachya* Griff. l.c. 13, t. 178. A.B.C. Becc. l.c. 66.

Pahang: Tahan River (Ridley); Malacca: Ching (Griffith); Province Wellesley: Permatang Bertam (Ridley 7003), Bukit Juru.

Native name " Kumbar." Distrib. Penasserim, Siam and Borneo. This is quoted in the Flora of British India as having been collected in Singapore and Penang Wallich 5000. Wallich says in Pl. As. Rar. he got it in Tenasserim. I have not seen it in Singapore.

19. Eugeissona, Griff.

Tufted palms with short stout stems or none. Leaves pinnatisect thorny leaflets lanceolate narrow not flagelliferous. Inflorescence terminal erect dense very large, branches short erect, covered with close fitting sub-distichous bract-like spathes passing into bracts and bracteoles. Flowers large hard textured, solitary or 2-3 together on the ends of the branches, uni- or bisexual. Male flowers, calyx cupular, trilobed, petals lanceolate pungent. Stamens 12, anthers elongate basifixed 1 seed, females. Fruit large ovoid covered with very small brown scales beaked 1 seeded. Seed globose, endocarp bony, aequable. Species 6 Malay Islands.

E. tristis, Griff. Calc. Journ. Nat. Hist. V. 101. Palm. Brit. Ind. 109, to 220 A. Tufts very large. Leaves 15 to 20 feet long, leaflets linear lanceolate acuminate subopposite 12 inches long $\frac{1}{2}$ inch wide bristly above petiole 7-10 feet all spiny. Inflorescence 4 to 6 feet tall. Flowers 2 inches long terminal on the scaly branches, bracts imbricating. Fruit ovoid beaked 2-3 inches long $1\frac{1}{2}$ inch through brown. Seed globose 1 inch through. Mart. Hist. Nat. Palm. III. 212, to 179, 180. Becc. Nuov. Giorn. Bot. Ital. III. 28. Hook. fil. l.c. 483.

Johor : Gunong Pulai (Ridley); Malacca : Sungei Hudang (Goodenough 1401) (Griffith) ; Selangor : Kwala Lumpur ; Perak : Larut Hills to 2500 feet alt.; Dindings ; Province Wellesley ; Penang (Curtis 2218).

The "Bertam" is widely distributed over hills of the west coast of the Peninsula. The midribs of the leaf are used for the blinds known as chicks and also when split and unfolded are woven into screens or partitions for houses. The stalk of the inflorescence is sometimes carved into ornamental walking sticks and the fruit is eatable.

20. Daemonorops, Bl.

Scandent rarely erect palms, strongly armed, usually forming a tuft of short stems, with a few long scandent branches, leaves pinnatisect, leaflets narrow linear acuminate, rachis thorny ending in a hooked flagellum. Inflorescence usually unisexual, male and female inflorescence on the same stem. Spathes several boat-shaped or oblong, spiny, at first quite covering the inflorescence, eventually deciduous, not sheathing. Inflorescence dense or lax panicled, peduncled. Flowers small very numerous often pedicelled bracteate, hard in texture brown or yellow. Male flowers; calyx tubular more or less three toothed. Corolla three-lobed with a short tube, longer than the calyx. Stamens 6. Filaments connate at the base into a ring with broad bases,

anthers oblong often sagittate at the base. Pistillode small. Female flowers larger, similar with three large recurved stigmas. Ovary incompletely three-celled clothed with scales. Fruit globose, oblong or turbinate covered with imbricating scales, polished yellow brown or red-resinous in one section. Seed globose, pitted, enclosed in a thin sweet pulp. Species about 60. Distribution, India, Andamans, China, Cochin-china, Malay Islands and Archipelago.

The plants of this genus are usually shorter and stouter than the *Calami*, and more densely armed, the leaves are always flagelliferous on the climbing stems and there are never any inflorescence-flagella, nor is the inflorescence ever armed with hooks, as in that genus, the spathes are never tubular, but broad flat or boat-shaped deciduous limbs. The flowers are more often pedicelled, and both sexes occur on the same plant. Owing to the shortness and thickness of the stem, the rattans of this genus are little valued by Malays, and are seldom collected. The fruit is often eaten or rather sucked for the thin sweet pulp as it is in the *Calami*. The species of the section *Piptospathae resiniferae* produce the red resin in the shells of the fruit known as Dragon's blood. In this genus and the next *Calamus* there has been great difficulty in identifying the plants with published descriptions. The species of the Peninsula were first described by Griffith, "Palms of British India," all or nearly all very incompletely, so that it has been by no means easy to identify his species. Hardly anything of his types exist, and the native names which he gives, which might help, are nearly all attributed to the wrong palms. Martins made matters little better. Beccari in the Flora of British India described a number of old species more fully than they had been previously done, but also gave names to miserable and useless scraps of leaves or fruit from the collections of Scortechini and others. The *Calameae* vary so much in form and armature of leaf and stem according to age of the plant, and in different parts of the plant, that leaf and stem fragments only are almost valueless. Furthermore the size of the spadices in Daemonorops especially, vary enormously according to the age of the stem. The spadices of the lower part may be only a few inches long while those of the upper part may be over a foot or eighteen inches. When to this is added the fact that in *Calamus* and some other genera the plants are unisexual and it is not only rare to get samples of both sexes, but it is also in some cases extremely difficult to correlate the two sexes, the great difficulty of studying the genera and the great liability to error will be understood. In collecting specimens the ordinary collector is apt to take only scraps of the plant, as adequate specimens are so bulky, that full specimens of say half a dozen species is a good load for a carrier.

§ 1. CYMBOSPATHAE. Spadix unopened, fusiform short, outer spathe boat-shaped spiny beaked entirely enwrapping the inner ones and

completely falling off after fruiting. Spadices short compact unisexual or rarely bisexual. Spadix bisexual, male and female flowers on the same spadix in pairs ... ... 1. *D. angustifolius.*

Spadices unisexual. Plant not scandent, forming a bush. Outer spathe densely covered with crinite bristle-like spines ... 2. *D. calicarpus.*

Outer spathe acutely 2 keeled. Spines scattered ... ... 3. *D. microthamnus.*

Scandent plants with long stems. Outer spathe completely covering the inner ones. Spadix elongate. Fruit globose.

Outer spathe abruptly beaked.

Spines slender black acicular, fruit globose.

Stem short, spathe under a foot long, beak longer than the body ... ... 4. *D. monticolus.*

Stem tall, spathe over a foot, beak shorter 5. *D. Lewisianus.*

Fruit obovoid ... ... 6. *D. aciculatus.*

Spines dagger-shaped scattered ... 7. *D. grandis.*

Spines broader connate in short rows 8. *D. carcharodon.*

Outer spathe gradually tapering fusiform at both ends ... ... 9. *D. hygrophilus.*

Spathes not completely covering each other ... ... 10. *D. calospatha.*

Spadix very compact, fruit young cylindric ... 11. *D. congesta.*

Doubtful ... ... 12. *D. imbellis.*

13. *D. pseudosepal.*

§ 2. PIPTOSPATHAE. Outer spathe not covering the others, panicle diffuse.

Resiniferae.

Stem unarmed, with low elevated ridges ... 14. *D. micracanthus.*

Stem strongly spiny, leaflets in distant pairs broad ... ... 15. *D. didymophyllus.*

Leaflets equidistant ... ... 16. *D. propinquus.*

Stems with few seathered spines ... ... 17. *D. leptopus.*

Not resiniferous.

Stems armed with strong spines at the mouth, fruit oblong ... ... 18. *D. Hystrix.*

Fruit globose, leaflets in alternate groups of three distant ... ... 19. *D. dissitophyllus.*

Leaflets equidistant, peduncle of spathe long ancipitous flat unarmed ... 20. *D. longipes.*

Peduncle not ancipitious armed ...	21. *D. geniculatus.*
Fruit turbinate	22. *D. elongatus.*
Stems with thick collars at the internodes covered with black bristles.	
Male flowers in short spikes 1 crowded distichous	23. *D. periacanthus.*
Male flowers in long lax spikes ...	24. *D. verticillaris.*

1. D. ANGUSTIFOLIUS, Mart. Hist. Nat. Palm. III. 329. Stem stout about 30 feet long -1½ inch through, greenish yellow covered with purple scurf, spines black crowded 2 inches long, those round the mouth an inch longer, sheath not swollen or wrinkled. Leaves 12-14 feet long, petiole yellowish with purple red scurf, back rounded, channelled above, armed with long black spines scattered over it especially on the edges, rachis green-purple scurfy with distant spines ¼ inch long on the back ; leaflets very close narrow linear acuminate 13 inches long ¾ inch wide, dark or light green, bristles rather long on the two lateral nerves above and the edges, a few on the midrib and tip above, numerous and close beneath. Spadices bisexual peduncled. Outer spathe canoe-shaped 6 inches long, grey dotted with red, with numerous flat black spines with pale bases along the keels and in transverse rows, beak 4 inches long, 2nd spathe narrower with a few small black spines on the keels, beak 3 inches, inner spathes papery unarmed. Spadix dense 6 inches long. Flowers smaller than in *D. grandis* ¼ inch long, one male and our female together, on each branchlet. Male, calyx very short cup-shaped ribbed brown. Petals three times as long, linear oblong brown ribbed. Stamens 6, filaments short with a broad fleshy base narrowed upwards, bases connate. Pistillode small. Female flower. Calyx as in male, petals shorter. Stamens *(apparently fertile)* 3. Filaments flatter and thinner, styles thick, fruit globose ½ inch long, scales about 8 rows, light chestnut with silvery edges, apex blunt dark brown, grooved ⅛ inch across. Seed flattened black, albumen densely ruminate. Miq. Fl. Ind. Bat. III. 89. Hook. fil. l.c. 464. *D. Sepal* Becc. Fl. Brit. Ind. VI. 465. *Calamus augustifolius* Griff. Calc. Journ. Nat. Hist. V. 89. Palm. Brit. India 95. t. 213 A. B.

Singapore : Garden Jungle (Ridley 5123) ; Malacca : (Griffith) ; Johor : Sungei Tebrau ; Selangor : Dusun Tua (Cantley) ; Negri Sembilan : Tampin Hill ; Perak : (King's Coll. 4133) Gunong Tambang (Scortechini) ; Penang : Balik Pulau (Ridley 7900). Endemic. Native name "Rotan Minyak."

The types of Beccari's *D. Sepal* are very poor specimens but are almost certainly this species.

2. D. CALICARPUS, Mart. Hist. Nat. Palm. III. 326, t. 176G, VI. A tufted palm emitting no climbing stems. Leaves numerous crowded about 6 or 8 feet long sheath strongly armed with close set grey spines 1½ inch long ; petiole flattened with greyish spines 1 inch long or less,

solitary or tufted in twos and threes erect and spreading along the edge; rachis with few or no thorns, when present stout and short usually in pairs, leaflets linear acuminate; flagella from the tops of the shortened upper leaves and from lower leafless sheaths, slender 1½ feet long with claws in twos and threes hooked or almost quite straight. Inflorescences several among the leaves on short stout flattened peduncles thorny above. Outer spathe boat-shaped beaked densely covered with bristle-like spines, reddish brown 6-7 inches long, beak flattened, inner sheath smooth long beaked. Male inflorescence 4 inches long compact, spathels short tomentose with an ovate acuminate limb, spathellules cup-shaped with an ovate limb. Flowers on sinuous spikes, ¼ inch long, calyx tubular ribbed obscurely 3 lobed, eventually breaking up into yellow fibres. Corolla twice as long, lobes oblong obtuse; anthers very short oblong bright yellow. Female inflorescence with stouter branches and larger flowers. Fruit oblong globose ½ inch long yellow scales longer than broad grooved edged with dark brown almost cordate in shape. Seed globose ⅜ inch long pitted. Miq. Fl. Ind. Bat. III. 87. Walp Ann. III. 457, V. 857. Hook. fil. Fl. Brit. Ind. VI. 466. *D. tabacinus Becc.* Fl. Brit. Ind. l.c.c. *D. petiolaris* Mart. Hist. Nat. Palm. III. 326. Miq. l.c.c. *Calamus calicarpus* Griff. Calc. Journ. Nat. Hist. V. 22. Palm. Brit. Ind. 99, t. 315 A. *C. petiolaris* Calc. Journ. l.c. 93. Palm. Brit. Ind. 101, 216, f. VII.

Johore: Bukit Soga, Batu Pahat (Ridley 11205); Malacca: (Griffith) Bukit Sadanen (R. Derry), Chenana Putih (Cantley's coll.); Selangor: Dusun Tua (Ridley 7878): Dindings: Pangkor (7897); Perak: (Scortechini) Larut, (Kunstler 2537), Gunong Keledang (Curtis 3357), Bujong Malacca (Curtis 3160). Native name "Chuchor Minyak." "Rotan Kusom." The leaves are used for making ataps.

3. D. MICROTHAMNUS, Becc. Rec. Bot. Survey Ind. II. 221. A small tufted erect palm, stems less than ½ inch through, sheaths short reddish fuscous mealy, spines few very slender scattered, mouth bare, exactly and horizontally truncate. Leaves about 6 feet long; petiole short unarmed hardly swollen at the base; rachis abortively flagellate densely armed with stout half conic nearly horizontal thorns; leaflets 18-20 equidistant linear very acuminate, 1½ inch long, a few bristles on the edge and keel, midrib beneath spineless. Female inflorescences little shorter than the leaves, erect, on a short peduncle, ventricose fusiform, beak ⅓ length of body unarmed; outer spathe acutely two-keeled at the base only, with scattered filamentous acicular spines. Fruit ovoid globose, apex conic acute ⅗ inch long by ½ inch through; scales cinnamon tip fuscous edge paler grooved.

Perak, (Scortechini).

4. D. MONTICOLUS, Mart. Hist. Nat. Palm. III. 328. t. 173. Stems tufted like an *Engeissona*, climbing stems slender ½ inch through, 15 feet long. Large leaves nearly as long, sheaths armed with flat thorns

½ inch long, narrow acuminate black at the base, mouth of sheath with a broad thin margin; petiole ⅓ length of the whole leaf, armed with few pale hooked thorns; leaflets linear long acuminate 16 inches long, a little over ½ inch wide, bristles on the keels and margins below few, numerous on edges at the long slender setiform tip; rachis strongly keeled; leaves on the flowering stems very much smaller about a foot long with very narrow leaflets, spathes 4 to 10 inches long; peduncle longer than limb, sometimes 4 inches long, outer spathe lanceolate narrowed at the base, armed with long very slender black spines, beak linear flat very long, longer than the body of the spathe, unarmed. Inner spathes unarmed. Spadix short under three inches long, unisexual. Male flowers, bract and spathel ribbed. Calyx tubular shortly three lobed and ribbed. Petals curved twice as long. Female spadix as long. Fruit rather large globose ½ inch through, scales orange yellow with a brown tip, edge scarious, grooved in centre, in 6 rows. *Calamus monticolus* Griff. Calc. Journ. Nat. Hist. V. 90. Palm Brit. Ind. 97, t. 214 A. B. C.

Penang Hill (Ridley 7034, 7896). Distrib. Borneo.

Beccari suggests that this is *D. petiolaris* Mart. *Calamus petiolaris* Griff. but that is described as erect and I should be inclined to refer it to *C. calicarpus*.

5. D. LEWISIANUS, Mart. Hist. Nat. Palm. 327, t. 175, f. IV. Stem stout about 20 feet long covered with long black spines. Leaf large, petiole over 7 inches long base swollen, strongly armed with long flat black spines especially on the edge and back; leaflets close equidistant narrow linear acuminate over a foot long ½ inch wide, bristly on edge, tip and nerves especially beneath; rachis hardly trigonous, with hooks in threes. Flagellum about four feet long, fairly stout, hooks solitary or as many as 6 together. Spadices unisexual, outer spathe over a foot long, 3 inches wide covered with spiny bristles slender and weak about an inch long, in series, beak 6 inches long, 2nd spathe less bristly and chiefly on keel and tip. Spadix about a foot long, branches rufous tomentose. Calyx tubular hardly lobed. Petals lanceolate not ribbed. Female spathe beak as long as the body, spadix 3 or more inches long. Fruit globose ¾ inch long yellow scales about 7 rows, edges paler, tip blunt, grooves shallow. Hook. fil. Brit. Ind. VI. 469. *D. Kirtong* Griff. Palm. Brit. Ind. 102 CCXVI B. *D. malaccensis* Mart. Hist. Nat. Palm. III. 327. *Calamus Lewisianus* Griff. Calc. Journ. Nat. Hist. V. 87, Palm Brit. Ind. 94, Pl. 212 A. *C. acanthopis* Griff. l.c. p. 102, t. 2170.

Johore: Bukit Soga, Batu Pahat (Ridley 11025); Penang: (Lewis) Moniot's Road (Ridley 9466), Waterfall (11461); Province Wellesley: Bukit Juru (Ridley 7100). Endemic, very distinct in its almost bristly spines. I think Griffith's *C. acanthopis* is this plant.

6. D. ACICULATUS, n. sp. Leaves 4-6 feet long, petiole 6 inches long thickly sprinkled with short sharp spines on all sides; leaflets

narrow linear acuminate close equidistant alternate and sub-opposite 8-10 inches low, ¾ inch wide, margins and 3 nerves and tip bristly with rather long pale bristles. Spathe thin fusiform tapering at the base into a long 4 inches peduncle, thickly armed pale flat narrow spines, body of spathe thickly armed with very narrow spines flat and greenish ⅛ to 1½ inch long solitary and in rows, limb of spathe 8 inches long 1½ inch wide, ending in a nude point 3 inches long, inner spathes papery unarmed. Male panicle 6 inches long dense, branches flexuous hairy. Bracts orbicular cuspidate ribbed. Calyx tubular cup-shaped with three distinct lobes, short, corolla twice as long, lobes oblong. Female spadix in fruit 6 inches long. Fruit obovoid shortly beaked ever an inch long yellowish brown. Scales in 8 rows edged with dark brown broader than long, subtriangular deeply grooved. Seed round very rugose and warted deeply pitted.

Perak, Larut Hills to the top (Ridley).

7. D. GRANDIS, Mart. Hist. Nat. Palm. III. 227, t. 173. An unisexual plant, stems several 15 to 30 feet long, 1 inch through covered with thorns in semicircles 2 inches long or less, bases green tips black. Leaves about 10 feet long, petiole about 4 feet long: leaflets alternate equidistant broadly linear acuminate glabrous or with a few short bristles on the upper midrib dark green (light pink when young), 24 inches long, 2 inches wide; rachis red when young; flagellum strong about 6 feet long. Spadices in the spathe narrow or swollen fusiform (very variable in size, 14 inches long or less. Outer spathe boat-shaped 1½ inch wide brown with two keels, spines numerous irregular black flat narrow 1½ inch long, beak narrow flat as long or longer than the body of the spathe, second spathe broader than the outer one with fewer spines chiefly on the keels, 3rd broad with spines along the midrib in the upper part, upper spathes papery brown unarmed. Male spadix 6 inches long, branches 6 or 7, crowded about 3 inches long, spikes flexuous ½ inch long with 8 flowers or less, all covered with rusty brown mealy scurf. Spathels thin obliquely cup-shaped. Flowers distichous, ¼ inch long fawn color; calyx tubular obscurely toothed with branched hairs on the tooth, ribbed; corolla nearly twice as long tube very short, lobes oblong short. Stamens 6, filaments fleshy thick connate below acuminate upwards. Anthers linear dorsifixed lemon yellow; pistillode abortive purple. Female spadix as large, branches thicker. Calyx as in male but more swollen corolla shorter. Stamens abortive. Stigmas stout papillose recurved. Fruit globose, not resinous, ½-inch through, scales broad yellow edged and tipped with brown, about ten rows. Seed, smooth elliptic flattened ½ inch across and ⅜ thick; albumen deep-nitted. Miq. Fl. Ind. Bat. III. 88. Hook. Fl. Brit. Ind. VI. 463. *D. intermedius* Mart. l.c. 377, t. 175. *Calamus grandis* Griff. Calc. Journ. Nat. Hist. V. 84. Palm. Brit. Ind. 91, t. 210.

Singapore: Garden Jungle, Bukit Timah etc. Malacca (Griffith); Selangor: Batu Tiga (Ridley); Negri Sembilan: Bukit Sulu (Cantley's

coll.); Province Wellesley: Bukit Juru (Ridley); Perak: (Scortechini) Gunong Malacca (King's coll. 7135); Kedah: Gunong Jerai (Ridley).

The commonest species in the south of the peninsula in woods. Native name, "Rotan Sumang." It is not valued for any purpose. I am quite unable to distinguish *D. intermedius* Mart. *Calamus intermedius* Griff. though Beccari keeps it separate and describes a variety *D. intermedius* var. *nudinervis*. Griffith, the original describer of it, was dubious as to its being distinct, and the two very slightly different forms pass readily into each other. Both grow side by side in the gradens and garden jungle, and as usual in this group there is a great variation in the size of spathe, dimensions of spines and bristleness of the leaves according to the age of the plant and its habitat.

8. D. CARCHARODON, n. sp. Unisexual, leaf large, petiole 8 inches long, somewhat swollen at the base armed with scattered flat grey thorns not very close at base, above with short flat broad spines; rachis with strong claws in fours; flagellum 3 feet long, claws in groups nearly encircling it, 7 or 8 in a group; leaflets linear acuminate 10 inches long $\frac{1}{2}$ inch wide close equidistant, bristly on all the ribs and tip. Spathe with a narrow peduncle 6 inches long, body swollen 7 inches long, beak 12 inches flat narrow, spines numerous flat grey broad, some very slender at base and apex, a few spines on the beak, 2nd spathe 6 inches long, beak 2–3 inches, spines few scattered on the back, upper spathes about 6, hardly or not beaked, unarmed. Male inflorescence short and dense. Calyx broad and short cup-shaped ribbed obscurely toothed. Corolla lobes hardly twice as long oblong obtuse ribbed. Female inflorescence, flowers larger more ribbed, corolla lobes shorter in proportion. Fruit globose, shining, sales shining cinnamon brown, much longer than broad, margins pale, apices deep brown blunt.

Singapore: Chan Chu Kang (Ridley 4269, 6279), Chua Chu Kang, Bukit Timah, Selangor Batu Tiga (Ridley 11983). Native name Rotan S'pat.

9. D. HYGROPHILUS, Mart. Hist. Nat. Palm. III. 204, t. 177. 11. A tall stout rattan, stem 2 inches through. Leaves large, petiole very stout back rounded, upper face flat, covered at the base with numerous short flat $\frac{1}{5}$ inch long triangular spines, numerous also on the edge and mixed with short thorns, mouth of sheath oblique, a slightly raised gibbous ridge at base of petiole, the whole sheath dark coloured covered with short triangular flat spines erect or appressed to the stem in undulating rows; rachis very stout armed with recurved thorns along the edge in pairs; leaflets linear acuminate alternate or subopposite 12 inches long $\frac{1}{2}$ inch wide, narrowed at the base, bristles short scanty on the nerves of the back; flagellum stout long with almost complete whorls of strong hooks. Spathe and spadix 18 inches long fusiform gradually narrowed at both ends. Outer spathe densely covered with flat thin spines, pale at the base grey at the tip, $\frac{1}{2}$ inch long arranged

in short bars and mostly connate at the base, beak nude except at the base with a pair of ridges continued from the body. Spadix male large, branches red scurfy, spathels small cup-shaped, calyx tubular shortly lobed strongly ribbed, petals longer oblong anthers linear. Miq. Fl. Ind. III. 901. Hook. fil. Fl. Brit. Ind. VI. 464. *Calamus hygrophilus* Griff. Palm. Brit. Ind. 96, t. 213 C.

Malacca: (Griffith) Bukit Sadanen (R. Derry); Selangor: Batang Berjuntai (Ridley 7880) Petaling. Native names "Rotan Ayer," "Rotan Chichi Landak."

10. D. CALOSPATHA, n. sp. Leaf large, rachis stout elliptic in section ribbed with a few strong ribs, hooks recurved stout solitary on the back rib, some large, others small; leaflets lanceolate acuminate 12 inches long ¾ inch wide equidistant with a very few scattered bristles. Spadix with a flat peduncle 9 inches long armed with broad dagger-shaped spines ¾ inch long pale, in series. Female spathes about 8 thin, the outer one 8 inches long an inch across, not completely covering the others, thin oblong, apex broad ending suddenly in a long beak; spines not numerous pale straight narrow bases thickened ¼ inch long, on the keels and beak, the upper spathes with few short spines on the keels, but many on the beak. Spadix unisexual short with short branches flowers short and thick. Calyx circular cup-shaped entire. Corolla lobes lanceolate acute twice as long. Stylearms very long and thick. Fruit large ½ inch through globose slightly flattened at the tip, not beaked scales numerous broader than long about 10 rows, orange with a brown edge. Seed, with 3 inner faces angled and back rounded.

Perak: Gunong Keledang (Ridley) (Scortechini).

11. D. CONGESTA, Ridl. Stem very stout 1½ inch through yellow. Leaves very long, petiole stout gibbous at base armed with strong flat scattered spines on the back and edge, rachis elliptic in section below subquadrate above armed with distant short pairs of hooks stout black tipped; leaflets distant alternate 18 inches long 1½ inch wide linear acuminate with a few very short bristles towards the tip; flagellum long strongly and closely armed with semicircular clusters of strong black-tipped hooks. Spathes not seen; spadix very short about 2 inches long very densely compact, spathels very short imbricating bract-like saucer-shaped. Fruit unripe cylindric dark brown scales elevated deeply grooved margins scarious.

Singapore, at Stagmount, (Ridley). A single plant in young fruit. Very striking from the very yellow stem, and the densely crowded spadix with a mass of fruit.

12. D. IMBELLIS, Becc. Records Bot. Survey India II. p. 220. Stem unknown, leaves not flagelliferous, rachis back rounded above acutely two sided unarmed, leaflets numerous equidistant narrowly ensiform largest 14-16 inches long ½ inch wide, very acuminate, bristly on the three acute and two secondary nerves above and only on the

midrib beneath, margins adpressed bristly. Spathes and flowers not described. Fruiting spadix pendulous laxly branched with a long peduncle 3 inches long, shortly and sharply spiny. Fruit rather large exactly ovoid abruptly mucronate about 1½ inch long, scales shining cinnamon-colour edged fuscous deeply grooved, seed globose. Allied to *D. sepal* Becc. Perak, (Scortechini) not seen.

13. D. PSEUDO-SEPAL, Becc. Fl. Brit. Ind. VI. 465. Stem 12-15 feet nearly ¾ inch in diameter, leaves 3-4 feet long, leaflets not numerous inaequidistant dark green very long and narrow, ⅔-¾ inch wide setiferous on the three nerves above and median beneath, petiole with very short spines except at the base where longer and more slender; sheath with very long elastic flat seriate spines, mouth nearly naked. Female spadix short. Fruit globose with a short broad mucro ⅔ inch in diameter pedicelled dirty yellow, scales few channelled margins narrowly scarious, tips discoloured, fruiting calyx not pedicelliform. Perak at 300 feet (King 7975). (Scortechini) not seen.

§ 2. PIPTOSPATHAE.

A. RESINIFERAE.

14. D. MICRACANTHUS, Becc. Fl. Ind. VI. 467. A tall rattan, stem unarmed except for short transverse raised ridges with an occasional short thorn from the centre of the ridge, about 50 feet long ½ inch through. Leaf 4 feet or more long; petiole broad 6-10 inches long flattened margined with short pale thorns, base scabrid, sheathing portion 2 inches long rough and gibbous at base; leaflets narrow linear 1 foot long ½ inch wide alternate, acuminate to a long point with few bristles except at the tip; rachis triangular with few distant hooks; flagellum, long strongly armed. Spathes linear oblong, outer one armed with transverse crests of flat spines, ¼ inch long grey. Spadix short under 6 inches, peduncle 3 inches or more long, the lower half armed with short conic black-tipped spines with a thickened base, branches of spadix short thick angular. Bracts very small ovate obtuse. Calyx saucer-shaped nearly flat with very short rounded lobes. Petals lanceolate ribbed about 4 times as long. Fruit oblong globose ¾ inch through, shortly beaked rhomboid rather broader than long brownish yellow, grooved down the centre very strongly resinous. Seed suborbicular flattened, albumen much pitted. *Calamus micracanthus* Griff. Calc. Journ. Nat. Hist. V. 62. Palm Brit. Ind. 92, Mart. Hist. Nat. Palm III. 339.

Singapore: Bukit Timah (Ridley); Johore Lama: (Ridley 10952); Negri Sembilan: Kwala Pilah on Bukit Senaling. (S. Moorhouse) "Rotan" Jerenang.

15. D. DIDYMOPHYLLUS, Becc. Fl. Brit. Ind. l.c. 468. Stem about 12 feet long, one inch through. Leaflets green with large and small flat dagger-shaped spines green to olive-colored, an inch long or less, mouth of sheath not wrinkled or dilated; petiole 8 inches long

flattened armed with long needle-shaped spines brown with yellow bases, scattered on the edge and on the back, and with wart-like small thorns with yellow bases, leaflets about 20 in alternate pairs, the upper one of each pair being the largest, terminal ones solitary, dark dull green oblong linear acuminate, glabrous 6-12 inches long, one inch wide; rachis rather slender laterally flattened dark green subtrigonous, claws in groups of 4; flagellum 18-30 inches long, with hooks in groups of 6 numerous. Spadix with a flattened peduncle with slender acute spines on the edge, at first cylindrical. Spathes 6, not overlapping, tubular, lowest 7 inches long, $\frac{1}{2}$-$\frac{3}{4}$ inch wide with short flat irregular processes in lines, lower ones thorn-shaped; 2nd spathe as long one inch wide thin leathery with a few crests on the upper end, upper spathes subcoriaceous not thorny. Spathels short acute. Male spadix long slender 14 inches long; spikes panicled slender zig-zag, spathellules very small ovate acute. Flowers opposite $\frac{1}{8}$ inch long, calyx broad cup-shaped with short teeth, corolla lobes narrow oblong. Female 8 inches long, branches thick erect, spathels $\frac{1}{2}$ inch long or less, limb short acuminate margins papery, spathellules short acute. Calyx lobes broadly ovate, corolla lobes much longer lanceate from a broad base $\frac{1}{4}$ inch long, stigmas long recurved. Fruit oblong $\frac{1}{2}$ inch long shortly beaked deep brown scales little broader than long grooved with much red resin. Seed globose, warty pitted.

Singapore: common in forest, Bukit Timah, (Ridley 5785), Selitar (3470), Changi (6672, 6273); Johore: Tanjong Kupang (Ridley 6285), Jaffaria (King and Hullett), Batu Pahat, (Ridley); Perak: Larut Hills (King's coll. 2593, 6313); Penang Hill: (Ridley 10345). Native Names, "Rotan Getah;" "Rotan Hudang," "Rotan Butong." Distrib. Borneo. Dr. Beccari names a plant collected by me at Selitar (No. 6277) *D. cochleatus*, Teysm. and Binn. Cat. Hort. Bogor. p. 381. *Calamus cochleatus* Miq. de Palmis Arch. Ind. p. 29. This species seems not to have been described but the specimen so identified is merely a variety with very short spathes and spadices.

16. D. PROPINQUUS, Becc. Fl. Brit. Ind. VI. 467. Stem stout nearly 2 inches through densely thorny with dark flat thorn 1 inch long, in series. Leaf long, petiole an inch through; rachis subtrigonous back flat armed with hooks single or three together; leaflets subaequidistant rather remote in opposite or subopposite pairs, one to two feet long $1\frac{1}{2}$ to wide linear lanceolate acuminate with bristles on the back nerves and tip. Male spadix very long cylindric 18 inches long with a broad flat peduncle, spines irregular $\frac{1}{2}$ inch long or less, lower spathe broad boat-shaped elliptic thick $2\frac{1}{2}$-inch long with long and short spines on the back and ribs, 2nd and 3rd spathe similar but longer with spines on the midrib only, the remaining ones cylindric tubular notched on one side 4 inches long or less, $\frac{3}{4}$ inch through unarmed. Spadix dense and close over a foot long, branches numerous slender strict. Spathels with a broad ovate limb. Calyx very short cup-shaped. Corolla lobes

linear oblong 4 times as long. Female spadix. Fruit pedicelled elliptic $\frac{3}{4}$ inch long, scales rounded convex channelled as long as broad yellow densely coated with red resin. Seed oblong pitted. *Calamus Draco* Griff. Calc. Journ. Nat. Hist. V. 65. Palms Brit. Ind. 75, t. 201 A.B. Mart. Hist. Nat. Palm III. 175. fig. 10, 3-8.

Singapore: Selitar, Bukit Timah (Ridley); Malacca: (Griffith); Selangor: Kwala Lumpor, (Ridley); Negri Sembilan: native collector Kemaman (Vaughan-Stevens); Perak: (Wray 3658); Penang: (Griffith). Native name "Rotan Jerevang." One of the most important sources of Dragon's blood in the Peninsula. The fruits are dried, and then shaken in a small hanging basket with cockle shells. The resin thus beaten off falls through the meshes of the basket and is collected on a cloth damped in hot water and squeezed into a block.

B. NON-RESINIFERAE.

17. D. LEPTOPUS, Mart. Hist. Nat. Palm III. 206, 329. Stem very stout $1\frac{1}{2}$ inch through, rattan $\frac{3}{4}$ inch through, internodes short with scattered groups of dagger-like spines flat and whitish solitary or in twos and threes on an elevated base. Leaves large, petiole swollen at base nearly one inch wide, back rounded, above flat or slightly depressed, spines on the back stout $\frac{1}{2}$ inch or less long fewer and smaller on the edge; rachis stout slightly flattened, hooks in groups of threes; leaflets linear acuminate 12 inches long $\frac{3}{4}$ inch wide equidistant with few or no bristles, or some on the nerves beneath, flagellum long, thorns 6 in a clump. Inflorescence 18 inches long on a stout peduncle armed with long slender straight thorns. Spathes large leathery, lowest boat-shaped 8 inches long, stiff 2 inches wide, with a few thorns on the lower part of two low ridges, thorns long, straight slender and pale, 2nd spathe 9 inches long smooth narrower. Branches few crowded rusty, spikes numerous short and thick. Spathels 4-angled brown, mouth scarious; spathellules funnel-shaped with a point. Calyx broad, lobes ovate acute ribbed, deeply separate. Corolla more than twice as long lobes broadly lanceolate subobtuse ribbed. Anthers linear base bifurcate. Female flowers $\frac{1}{4}$ inch long secund crowded. Calyx short deeply 3 lobed, ribbed. Petals acute twice as long, staminodes in a corona fleshy, with 6 points. Fruit globose dark brown, scales convex channelled edges dark brown seed. Walp. Ann. III. 479. V. 818. Hook. fil. Fl. Brit. Ind. VI. 468. *Calamus leptopus* Griff. Calc. Journ. Nat. Hist. V. 78. Palm. Brit. Ind. 87, t. 205 A.B.

Singapore: Bukit Mandai (Ridley 1670, 3497), Kranji, etc.; Johore: Sungei Tebrau (Ridley 11519); Malacca: (Griffith) Sungei Hudang, Bukit Kandong; Selangor: Langkat (Ridley); Perak: Goping, (King's coll. 5919). Forests "Rotan Bakau:" "Rotan Muruseh."

18. D. HYSTRIX, Mart. Hist. Nat. Palm III. 205, t. 176, fig. 4. Stem about 30 feet long $\frac{1}{2}$ inch through, rattan $\frac{1}{2}$ inch through. Leaves 7 feet long, petiole $\frac{1}{3}$ of the length of leaf, spines flat reddish about

one inch long below shorter above ; sheath with long flat deflexed spines below and very long crowded erect ones at the mouth ; rachis glaucous when young, claws three in a clump brown, leaflets equidistant linear close, dark green 12 inches long ½ inch wide, bristly on both sides, longest bristles beneath ; flagellum 1½ feet long. Inflorescence 2 feet long, lowest spathe short woody 6 inches long with long flat spines at the mouth, and shorter ones below, upper ones 5 to 7, broad coriaceous with a few spines on the midrib or unarmed. Male panicle with about 5 stout branches spathels smooth with a short free limb. Spathellules similar but smaller. Spikes flexuous red-mealy, flowers small. Calyx short cup-shaped rounded. Corolla tube broad and rounded strongly ribbed, lobes short lanceate ribbed. Anthers linear with diverging bases. Female spadix stout scurfy 18-20 inches long branches appressed. Calyx short cup-shaped with short points. Petals dilate at base ribbed above, lobes lanceate acute smooth. Stigma stout. Fruit oblong yellow shining pedicelled ¾ inch long, scales broader than long, channelled edge scarious not resinous. Seed oblong ½ inch long, albumen ruminate pitted. Miq. Fl. Ind. Bat. III. 91. Walp. Ann. III. 477. V. 328. Hook. fil. Fl. Brit. Ind. VI. *D. hirsutus* Bl. Rumphia III. 21, t. 135. Miq. Fl. Sum. 593. *D. oblongus* Bl. Rumphia l.c. 140, 141, 142. *D. Calamus hystrix* Griff. Calc. Journ. Nat. Hist. V. 71. Palm. Brit. Ind. 80, 204. *C. hirsutus* Miq. Verh. Kon. Akad. Wetensch. XI. 28.

Singapore : Common, Garden Jungle, Bukit Timah etc. (Ridley 3481, 3483, 3484, 3485) ; Johore : Sungei Tebrau (Ridley 11514) ; Malacca : Chenana Putih, (Cantley's coll.), Ayer Panas (Maingay) Griffith ; Perak : Goping, (King's coll. 4774) Larut (5142) ; Kwala Lipis (Machado 11612) ; Dindings : Lumut (Ridley 8404) ; Penang Hill (Curtis) ; Selangor : Batu Tiga (Ridley) ; Pahang : Kwala Lipis (Machado). Native name " Rotan Sabut." The rattans are used in rigging for boats. " Rotan Machap Merah." var. *minor* Becc. Fl. Brit. Ind. l.c. is a smaller state of the plant.

19. D. DISSITOPHYLLUS, Becc. Nelle. Foresti di Borneo p. 608. A stout very thorny rattan about 20 feet tall, sheath armed with strong yellow spines, very long at the mouth as in *hystrix*, lamina 6 to 8 feet long with a stout flagellum, rachis angled armed with very stout hooks ; leaflets linear acuminate with a long point in alternate threes, 12 inches long 1½ inch wide, sparingly setose on the margins except at the tip which has many black setae. Spadix with a long rather narrow flattened peduncle armed on the edge with short ¼-inch spines in pairs black-tipped. Spathes 6 or 7, cartilaginous brown lanceolate sheathing unarmed subacute, the lowest 6 inches long ½ inch wide. Male panicle about a foot long with few distant branches about 4 inches long. Flowers ¼ inch long alternate, bracts shorter than the pedicel. Pedicel nearly flat at the top quite round. Calyx cup-shaped with short traces of points. Corolla twice as long oblong linear. Stamens narrow linear.

Female flowers rather larger. Fruit globose ½ inch long, scales yellow as broad as long edged brown grooved. Albumen ruminate.

Singapore: Bukit Timah (Ridley 10408, 10814, 9205). Jurong (10813); Johore: Gunong Panti, Batu Pahat (11207); Perak: Bujong Malacca (Ridley). Distrib. Borneo.

20. D. LONGIPES, Mart. Hist. Nat. Palm III. t. 176. fig. V. 2, 3. Stem 20-30 feet long, very stout, leaves 12 feet long, sheath with very long stout spines, crowded at the mouth 5 inches long, with a number of black bristles, petiole stout back rounded with very long, flat acuminate greenish spines 1½-4 inches long solitary or few together; rachis triangular; flagellum 5 feet long, hooks 3 to 5 in a clump; leaflets equidistant or inaequidistant linear to linear lanceolate 14 inches long 1 inch wide bristly on the back, tip and edges. Inflorescence with a flattened two-edged unarmed peduncle over a foot long, branches numerous branchlets slender dense, spikes flexuous. Spathes tubular, cylindric, spathels smooth mouth with a simple ring, spathellules saucer-shaped limbs spreading. Flowers small. Male flowers. Calyx tubular ribbed. Corolla lobes smooth blunt. Females branches wide spreading, calyx tubular ribbed shortly 3 lobed. Corolla not much larger. Fruit ellipsoid oblong mammillate ¾ inch long, yellowish, scales a little longer than broad, in 14 rows channelled. Miq. Fl. Ind. Bat. III. 93. Hook. fil. Fl. Brit. Ind. VI. 471. *D. strictus*, Bl. Rumphia III. 19, 163 A. B. Mart. l.c. 326. *Calamus longipes*, Griff. Calc. Journ. Nat. Hist. V. 68. Palms Brit. Ind. 178, t. 203 A. B. *C. strictus*, Miq. Palm. Arch. Ind. 28.

Singapore: Chan Chu Kang (Ridley 3490, 6299), Changi (3496), Bukit Timah (6902); Johore: Tanjong Kopang (Ridley 6284), Sungei Tebrau, Muar, (Feilding); Malacca: (Griffith), Selandau (Ridley 10794); Penang: (Fox). Native names, "Rotan Machap," "Rotan Chochor," "Rotan Sepah."

21. D. GENICULATUS, Mart. Hist. Nat. Palm III. 329. Stem 20 feet long an inch or more through densely thorny. Spines mostly fine, flat and pale, some slender and longer, those round the mouth of the sheath very long, erect 2 inches. Leaves large 12 feet long, petiole stout 2 feet long an inch across, back rounded spines in short rows on the back usually one long several smaller, greenish flattened; rachis stout with short black tipped hooks 4 or 5 in a clump; flagellum 6 feet stout with powerful claws in clumps; leaflets linear, lanceolate equidistant, subopposite 14 inches long 1½ inch wide. Female spadix stout 18 inches long, compact, branches stout, spathes papery 18 inches long smooth, keeled, acuminate, branches 6 inches long, spikes undulate stout, spathels mealy bracts ovate orbicular. Calyx cup-shaped ribbed. Petals about twice as long. Fruit globose ¾ inch long, scales yellowish brown longer than broad, channelled, edge darker. Seed globose pitted. Miq. Fl. Ind. Bat. III. 39. Hook. fil. Fl. Brit. Ind. VI. 470 (partly). *Calamis geniculatus*, Griff. Calc. Journ. Nat. Hist. V. 67. Palm. Brit. Ind. 77, t. 202 A. B. Miq. Palm Arch. Ind. 28.

Singapore: N. Selitar, Bukit Timah (Ridley); Muar: (Fox 11297); Selangor: Ginting Bidai (Ridley 7092 Pahang Track; Perak: Goping (Kunstler 576); Larut Hills: (Ridley, King's Coll. 2735); Bujong Malacca (Ridley 9811); Penang: (Lewis); Kedah: Gunong Jerai (Ridley). Endemic. Native names, "Rotan S'grah," "Rotan Dadok."

22. D. ELONGATUS, Bl. Rumphia III. p. 16. Leaf large about 4 feet long, rachis trigonous hooks solitary or in pairs; petiole with strong scattered flat pale spines along the edges and recurved ones on the back; leaflets linear acuminate 12 inches long $\frac{3}{4}$ inch across equidistant setulose on nerves and tip. Flagellum slender 2 feet long, hooks small in clumps of 5 and 6. Peduncle about 6 inches long and very stout armed with slender acute spines on the edge, some nearly $\frac{1}{2}$ an inch long surrounded with shorter ones in circles. Lower spathe persistent coriaceous oblanceolate 4 inches long, the back armed with slender spines like those on the peduncle. Upper sheaths thinner, spiny. Male spadix not seen. Female spadix stout a foot or more long, branches few and stout, branchlets angled scurfy. Spathellules tubular with a saucer-shaped top acute. Flowers distinctly pedicelled, pedicel thick. Calyx cup-shaped, ribbed. Corolla lobes more than twice as long, lanceate. Styles stout. Fruit $\frac{1}{2}$ inch long, turbinate, scales rhomboid, as broad as long in about 10 rows, cinnamon-brown with paler edges. Seed flattened sub-globose with deep rumination pits. *D. Kunstleri*, Becc. Fl. Brit. Ind. VI. 469.

Singapore: Chan Chu Kang, North Selitar, etc. (Ridley 1667); Pahang: Kwala Tebrau (Ridley); Selangor: Bukit Kutu (Ridley); Perak: Ulu Bubong (King's Coll. 10204), (Scortechini 652), Thaiping Hills (Ridley); Penang Hill: (Curtis 2150, Ridley 10343); Balik Pulau (Ridley 7905); Kedah: Gunong Jerai (Ridley). Distrib. Borneo.

Near *D. hystrix* but with quite different fruit and a peculiar thorny peduncle. Identified by Dr. Beccari.

23. D. PERIACANTHUS, Miq. Fl. Ind. Bat. III. 593. Stem about 40 feet long, 1 inch through covered with raised rings in pairs of bristles and long thorns, the upper ring deflexed, the lower one erect. Leaf about 5 feet or more long, flagelliferous, petiole over a foot long armed with long erect thorns 3 inches long, pale arranged in half whorls and with half whorls of black bristles; rachis armed with distant groups of hooks; flagellum rather slender, leaflets rather unequally distant linear broad 12 inches long $\frac{3}{4}$ inch wide, bristly on back, edges and tips. Male spadix over 2 feet long, peduncle rather slender, 18 inches with tufts of bristly spines along the edge. Spathes several thinly coriaceous, the lowest 18 inches or less long 1 inch wide, covered with long brown or black bristles in tufts, lanceolate, the upper ones thin, smooth unarmed. Branches of spadix crowded rather thick numerous. Spathels tubular scurfy. Spikes alternate 1 inch long. Flowers closely distichous. Spathellules flat, saucer-shaped. Bracts cup-shaped, rib-

bed. Calyx tubular, ribbed entire. Petals twice as long, oblong, blunt. Stamens 6, filiform, purple. Pistillode of 3 purple arms. Female spadix stouter and hardly as long, flowers distant. Spathels longer. Calyx lobes distinct ovate. Fruit globose pedicelled ½ inch long mammillate yellow, scales broader than long. Edge scarious with an inner dark brown line. Seed. *D. verticillaris*, Mart. Hist. Palm l.c. (partly) Becc. Fl. Brit. Ind. (partly).

Singapore: near Kranji, Chan Chu Kang (Ridley 3493); Johore: Sungei Tebrau, (Ridley); Malacca: Bukit Sadanen (Derry), Mt. Ophir (Ridley); Pahang: Kwala Lipis (Machado 11632), Tahan river (Ridley); Perak: Thaiping Hills (Ridley 11409); Assam Kumbang (Wray 1922); Bujong Malacca: (Ridley 9813). Native name "Rotan Gulang." Distrib. Sumatra.

24. D. VERTICILLARIS, Mart. Hist. Nat. Palm III. 329, t. 175 (in part). Stems 50 to 60 feet long an inchthrough densely covered with raised rings of flat grey spines, in pairs, one ring of spines pointing upwards and one downwards, mixed with black bristles. Leaf 4 feet or more long terminated by a long rather slender flagellum with distant half whorls of hooks; petiole over a foot long strongly armed with long flat pale spines in half whorls, 1-1½ inch long spines at mouth of sheath 4 inches long; leaflets equidistant 1 inch apart, broadly linear acuminate 12 inches long by 1 inch wide, midrib and two nerves prominent, bristly on nerves and point. Male spadix over 2 feet long, peduncle long flattened, armed with short, black bristles in tufts along the edge. Spathes 5 or 6, lower one 7-15 inches long, 1¼ inch across linear acuminate, covered with black bristles in rows, upper spathes thin lanceolate, subacute, shorter, nearly unarmed, with a few tufts of bristles. Branches of spadix sub-terete eventually spreading; 2-4 inches long. Spathels tubular or long cup-shaped with a short point ribbed as long as the flower. Flowers alternate single or in pairs, sub-distichous or spiral. Bract cup-shaped deep. Calyx ribbed tubular, very shortly 3 lobed. Corolla lobes twice as long; oblong obtuse. Stamens 6, filaments filiform, red, connate at base. Pistillode short red. Female spadix wide spreading over 2 feet long, much branched. Spikes thicker than in males, flowers rather distant. Fruit globose, dark red, ⅝ inch long, scales in about 7 rows exactly rhomboid, grooved, slightly resinous. Seed globose ruminate. Miq. Fl. Ind. III. 99. Hook. fil. Fl. Brit. Ind. VI. 470, (partly). *Calamus verticillaris*, Griff. Calc. Journ. Nat. Hist. V. 63. Palm. Brit. Ind. 73 to 200.

Johore: Tebing Tinggi (Ridley 11202), Panchur (10953); Malacca: (Griffith) Ayer Panas (Ridley 1580), Selandau (10795); Pahang: Kwala Lipis (Machado); Negri Sembilan: (Hale), Seremban (Moorhouse). Native name, "Rotan Chinchin." Rattans used for rigging. Dist. Borneo.

This has been confused by Martius and Hooker with *D. periacanthus* especially in the matter of the male flowers, those of the latter being described as those of this species. (Fl. Brit. Ind.) The spathes of both are very similar.

INDETERMINABLE.

D. VAGANS, Becc. Fl. Brit. Ind. VI. 469.
D. SABUT, Becc. l.c.
D. OLIGOPHYLLUS, Becc. l.c. 470.
D. MACROPHYLLUS, Becc. l.c.c.

All descriptions of scraps of leaves, from King's and Scortechini's collections.

21. CERATOLOBUS, Bl.

Scandant unisexual palms. Leaves flagelliferous, leaflets distant lanceolate to cuneate. Spathe solitary, persistent, thin boat-shaped beaked, somewhat flattened, unarmed splitting on the ventral face. Spadix short laxly branched, spathels tubular. Bracts ovate. Male flowers smaller than female, calyx very short 3 lobed, petals free to the base short oblong obtuse. Stamens 6 adnate to petals at base. Pistillode minute. Female spadix shorter, calyx distinctly tubular. Petals larger and more acute. Fruit one-celled, one-seeded, scales few, seed globose or flattened, testa fleshy, albumen deeply pitted or ruminate.

Species 5 or 6, Malay Peninsula and Islands.

Very large plant, leaflets few, cuneate rhomboid. ... ... 1. *C. Kingianus.*

Slender plants leaves narrow lanceolate.

Leaves in clusters or opposite. ... ... 2. *C. Laevigatus.*

1. C. KINGIANUS, Becc. Fl. Brit. Ind. l.c. 477. Stem 25 to 50 feet long, 1¼ inch through, leaves 3-4 feet long, sheaths unarmed transversely rugose, mealy white, petiole 6-8 inches long, base gibbous, spiny with short conic spines in groups. Leaflets few, cuneately rhomboid or trapezoid plicate acuminate lobed and toothed, white beneath, 6 to 9 inches long, 3 to 4 inches wide. Inflorescence sessile, 8 to 10 inches long, erect narrow, branches short, glabrous. Spathe 8 to 12 inches long, elongate, oblong, thinly coriaceous. Male flowers $\frac{1}{12}$ inch long, glabrous. Calyx cupular, minute; petals narrow, three times as long. Fruit elliptic or spherical shortly beaked with petals broadly ovate, $\frac{2}{3}$ to $\frac{3}{4}$ inch through, scales longer than broad, mahogany brown with darker tips, hardly channelled. Seed nearly smooth.

Perak: (Hullett, King's Coll. 2547, 2856, 5589). (Wray 2869). Endemic.

2. C. LAEVIGATUS, Becc. Fl. Brit. Ind. VI. 477. Stems short, about 8 or 9 feet tall ¼ inch through, brown when dry, spines strong, flat, scattered single or paired, decurved pale. Leaves about 2 feet long

(18 to 30 feet, Beccari), petiole very short, with a stout swollen collar on the sheath; rachis armed with strong hooks; leaflets linear lanceolate, rather abruptly acuminate 7 inches long, ½ inch wide with a few bristles on the edges and tip, in distant fascicles of 5 or 6 or pairs. Inflorescence very short 3 to 8 inches long. Spathes fusiform, beaked 6 to 8 inches long, not caducous, almost unarmed except for a few spines on the peduncle. Branches slender, spathels tubular with a short limb, spathellules ovate, ribbed. Male spadix flowers small, subglobose. Calyx short deeply 3 lobed. Petals broad. Female spadix stouter. Calyx distinctly campanulate. Petals oblong, much longer. Fruit pedicelled, ovate spherical, beaked, chestnut red ½ inch long, scales rhombic, hardly grooved rather large about 8 rows. Seeds bun-shaped, flat beneath rounded above ⅜ inch long, albumen deeply pitted. *Calamus Laevigatus*. Mart. Hist. Nat. Palm. III. 339. Miq. Fl. Ind. Bat. III. 129. *Calamus*, sp. Griff. Calc. Journ. Nat. Hist. V. 72. Palm. Brit. Ind. 72.

Selangor: Semangkok Pass (Ridley 12120), (King's Coll. 575, 971); Perak: Goping (Kunstler 96), Bujong Malacca (Curtis, Ridley 9812), Gunong Keledang (Ridley 9808), Kamuning (Machado); Dindings: Lumut (Ridley, 7904, 10240, 3489). Endemic. In hill woods. Beccari gives the length of stem 15 to 20 feet, and leaves 18 to 30 feet. I never have seen it as big as this.

22. Calamus, Linn.

Climbing or rarely non-scandent palms, strongly armed with thorns or spines: unisexual with pinnate leaves ending in a bare portion armed with hooks (flagellum) or not. If not, with long slender flagella from the leaf sheath, armed with hooks and having one or more close fitting sheaths, (*Inflorescence flagella*). Inflorescence usually branched, long, pendulous, axillary with tubular sheaths with or without a limb, often armed (spathes), the branches with similar but smaller sheaths, (spathels). The flower spikes with small sessile distichous flowers each with a small sheath, (spathellule) and an ovate bract. Calyx tubular, 3-lobed. Corolla little longer, stamens 6 connate at the base. Female flowers usually larger, ovary scaly. Stigmas 3 recurved, ovules basilar erect. Fruit globose or ellipsoid, turbinate or oblong, drupaceous covered with appressed scales testa pulpy, seed globose, oblong or hemispheric. Embryo ventral or basal, albumen pitted, ruminate or equable. Species about 200 chiefly Malayan, also African, Indian, Siamese, Chinese to Formosa, Australian. The Calami are much less known than the plants of the genus *Daemonorops* on account of their rattans being so much valued that they are always liable to be cut before the plants flowers, so that in forests easily accessible it is seldom that one can find flowers and fruit. Nor do all the stems even when full grown produce flowers, so that one may find many plants of a species and never one in flower. Thus *Calamus insignis* is very widely scattered

and abundant all over the peninsula, yet male flowers are unknown and females and fruit hardly ever seen. It is one of the most valued of rattans, which is perhaps one of the reasons of the scarcity of its flowers and fruit.

A number of species have been very inadequately described, often from mere scraps, as collectors find these plants too bulky for ordinary collecting and often bring back from the forests a fragment of a leaf and portion of inflorescence only. Good characters are to be obtained usually from the leaf sheaths but these are rarely collected. I have utilized the presence or absence of the inflorescences flagellum as a grouping character, and it is probably one of the best, but unfortunately specimens do not always show whether the leaves are flagelliferous, or whether there are independent flagella, which as they usually bear distinct remains of spathes, are undoubtedly abortive inflorescence. In the species with flagelliferous leaves, *i.e.* the rachis prolonged and not provided with leaflets, it is only the leaves of the climbing stem, and often only the upper ones which are flagelliferous, and collectors are very apt to bring in only portions of leaves or leaves without flagella, as being more easily handled, so that in some cases it is yet doubtful as to whether the species has leaf-flagella or not.

§ 1. MISCHANTHECTAE. With inflorescence flagella, leaves not flagelliferous. Leaflets few lanceolate, broad and distant, stems slender.

No distinct petiole, lowest pair of leaflets depressed round the stem ... ... 1. *C. pencillatus.*

Lowest pair of leaflets not deflexed, leaflets small, spadix short, little branched ... 2. *C. penangensis.*

Leaflets 4, large, spadix long and slender, leaflets lanceolate base acuminate ... 3. *C. filipendulus.*

Leaflets elliptic, shortly narrowed at base spadix elongate ... ... 4. *C. insignis.*

Spadix short compact ... ... 5. *C. subspathulatus*

Leaflets large, rhomboid distant white beneath... ... ... 6. *C. rhomboideus.*

Leaflets lanceolate, broad, very numerous stem very stout, spadix very long slender 7. *C. scipionum.*

Spadix long, stout ... ... 8. *C. ornatus.*

Leaflets linear numerous.

Spadix long, pendent ; spathes with a short limb ; spadix simple with stout recurved spikes, with close-set distichous flowers, spathels unarmed, spikes rather slender, short ... 9. *C. densiflorus.*

Spathels thorny, spikes broad and large ... 10. *C. Ridleyanus.*

Spathels rugose scabrid, spikes larger ... 11. *C. radulosus.*

Spadix panicled much branched in male, spikes slender. Flowers small distant. Stem slender, transversely wrinkled ... ... 12. *C. rugosus.*

Stem armed with close strong thorns ... 13. *C. luridus.*

Spadix very long, much branched, male flowers crowded, distichous pale. Leaflets broad and strongly black setulose ... 14. *C. Diepenhorsti.*

Leaflets narrow, not setulose on the backs, more slender plant ... ... 15. *C. Singaporensis.*

Spathes with large thin papery limb.

Spadices long, diffuse pendulous, very stout climbers, fruit large. Stem very thorny 16. *C. paspalanthus.*

Stem sparingly thorny, petiole gibbous at base ... ... 17. *C. intumescens.*

Spadices erect, fruit pisiform, seed flattened rugose, plants hardly climbing, leaves 1½ inch broad ... ... 18. *C. ramosissimus.*

Leaves narrow ¼ inch wide, panicle long, slender, thorny ... ... 19. *C. multiramea.*

Panicle erect, stiff, little branched, thorns, acicular ... ... 20. *C. perakensis.*

Panicle slender, erect, thorns broad, woolly ... 21. *C. lanata.*

Slender rattans with short inflorescence, branches scorpioid, male flowers long, seed elliptic, wrinkled. Panicles small, stem scabrid, thorns few, leaves setulose on sides both spathes almost unarmed 22. *C. ciliaris.*

Leaves setulose beneath only, spathes armed ... ... 23. *C. exilis.*

Panicles diffuse, stem strongly armed with flat acute thorns ... ... 24. *C. Curtisii.*

Dwarf not scandent rattans, with short dense spadices of large flowers, fruit obovoid conic black.

Leaves white beneath ... ... 25. *C. Lobbianus.*

Leaves green on both sides ... ... 26. *C. conirostris.*

§ 2. PHYLLANTHECTAE.

Leaves flagelliferous, no inflorescence-flagella. Slender rattans with few lanceolate distant leaflets.

Leaflets white underneath, panicle large ... 27. *C. caesius.*

Leaflets green on both sides, panicle simple ... 28. *C. distichus.*

Large rattan with few broad distant

leaflets panicle long ... ... 29. *C. palustris.*

Slender rattans, leaflets linear numerous.

Leaflets in fascicles, spadix simple, few-branched erect ... ... 30. *C. brevispadix.*

Spadix simple unbranched nodding ... 31. *C. elegans.*

Spadix long, much branched, spikes 2½ inch apart fruit oblong ... ... 32. *C. viridispinus.*

Spikes 1½ inch apart fruit globose ... 33. *C. oxleyanus.*

Leaflets inaequidistant in pairs ... ... 34. *C. longispatha.*

Leaflets equidistant close, leaflets lanceolate linear crowded ... ... 35. *C. pallidulus.*

Leaflets linear, spadix short, spikes scorpioid 36. *C. diffusus.*

Spadix extremely long, unarmed ... ... 37. *C. laxissimus.*

Stout rattans with numerous leaflets, panicles large, seed hemispheric, rugose, albumin equable.

Leaflets crowded narrow, stem densely armed with black thorns ... ... 38. *C. aquatilis.*

Leaflets distant broad, stem pale with few thorns ... ... 39. *C. dumetorum.*

Inflorescence of few short, broad spikes erect. Stemless bush ... ... 40. *C. castaneus.*

Climbing palm ... ... 41. *C. turbinatus.*

1. C. PENCILLATUS,* Roxb. Fl. Brit. Ind. III. 781. Stems slender, 20 to 60 feet long, ½ inch through, covered with stout scattered thorns, flattened with thickened leaves. Leaves 1 to 1¼ feet long; petiole very short or none; rachis slender armed with numerous hooks, base of petiole not swollen; leaflets 7 to 11 pairs distant sub-opposite, the two basal one deflexed and clasping the stem, the terminal pair connate at the base, bright shining green, lanceolate, elliptic or oblong, 6 inches long, and 1 to 1¾ inch wide, strongly 3 nerved, tip bristly. Flagellum from below the leaf very slender and long. Male spadix, peduncle about 5 feet long, very slender, thorny, with several short sheaths, spathes dilated upwards armed with hooked thorns, mouths ciliate, spikes distant 4 to 8 on a branch 2½ inches long distant. Flowers crowded alternate distichous, spathellules flat ribbed as long as the bracts, calyx tubular, shortly trilobed. Corolla twice as long, lobes narrow. Female spadix stouter, flowers rather more distant. Fruit oblong ¼ inch long, scales yellowish, broader than long, deeply grooved. *C. Javensis*, Bl. Rumphia II. Pl. 137, III. 62, pl. 153. Hook. fil. Fl. Brit. Ind. l.c. 442.

*The name is given as *pencillatus* in Clarke's reprint but *pencillatus* where quoted in other works. I have not seen the original edition of Roxburgh's Flora of British India.

Singapore: Kranji, Bukit Timah (Ridley); Johor: Gunong Panti, (Ridley); Kwala Sembrong (Lake and Kelsall); Malacca: Bukit Sadanen (Derry); Sungei Ujong: (Cantley); Pahang: Tahan River, Tembeling (Ridley); Kwala Lipis (Machado) Penang: (Roxburgh). Distribution Java and Borneo.

Var. (a) *purpurascens*, stem short leaves purplish. Rachis crimson. This might be specifically distinguished. Chiefly in the hill districts. Selangor; Kwala Lumpur, (Curtis); Perak: Thaiping Hills, Kamuning (Machado); Gunong Batu Putih (Wray 981) and Relau Tujor (2606); Kelantan: Kwala Lebir (Dr. Gimlette). Distrib. Borneo.

Var. (b) *inermis*. Stem almost unarmed; Malacca: Mt. Ophir (Ridley 10119, 3475); Negri Sembilan: Gunong Angsi.

Var. (c) *Penangianus*, (Becc). Stem closely spiny, with rather broad spines. Penang: Mt. Elvira, Waterfall Hill. (Curtis). Distribution Java and Borneo. Native names, Rotan Lilin, Rotan Sindek, Rotan Sini.

Roxburgh's description gives the number of leaflets as "thirty-four pairs," which has puzzled most botanists. It is obviously a mistake for 3 to 4 pairs, as can be seen by reference to his type in the British Museum, which is undoubtedly this common plant. Blume makes two varieties and Beccari 5 more and many more might be made, as the plant is very variable. The number of leaflets varies apparently with age of the plant, as well as with the locality. The Singapore form much resembles Blume's var. *tetrastichus*. The most distinct variety here is the pretty mountain form *purpurascens*. It is more compact with very reddish colored leaves, and a crimson rachis to the inflorescence.

2. C. PENANGENSIS, Ridl. Stem slender, as thick at top as a goose-quill, sheaths striate, armed with scattered short thorns pointing upwards; petiole very short 1 inch long; rachis thickly armed with numerous short recurved thorns, solitary or in pairs, leaflets about six, two terminal connate at the base, distant lanceolate acuminate with a few rather strong, black bristles at the tip, margins thickened nerves six, transverse nervules elevated, conspicuous when dry. Spadix male 18 inches slender, spathes narrow armed with scattered black tipped hooks. Branches about four, 6 inches long, spikes distant an inch long alternate, spathels smooth unarmed. Flowers rather distant small. Calyx ribbed, campanulate. Flagellum very slender.

Penang: West Hill (Curtis 2268). This plant is perhaps the species intended by Beccari, by *C. Martianus* Becc. Fl. Brit. India VI. 459. This was based on a plant collected by Gaudichaud in Penang. Martius confused it with Roxburgh's *C. pencillatus*, and published a description under that name composed of notes about Gaudichaud's plant with some of Roxburgh's description of *C. pencillatus* added,

(Hist. Palm III. 334) quoted as *C. paniculatus* Mart. in Fl. Brit. Ind. l.c. Neither Beccari nor Hooker had seen Gaudichaud's plant and as the description is a mixture and very inadequate for identification it would perhaps have been better to have disregarded Martius' description altogether. Curtis' specimen is in a young state, and the plant has only been collected once, and I have failed to rediscover it on West Hill. It resembles Martius' figure of *C. equestris*.

3. C. FILIPENDULUS, Becc. Fl. Brit. Ind. VI. 443. Stem 15 to 30 feet long, ½ to ¾ inch through, sheaths armed with flat triangular spines. Leaf 3 to 4 feet long, petiole 3 to 7 inches long, back rounded, edge armed with sharp slender spines ⅛ inch long, leaflets 3 pairs, upper pair connate, lowest pair not deflexed, oblanceolate, narrowed at the base 10-24 inches long, 3 inches across glabrous apex subacute; rachis triangular. Spadix slender, over 4 feet long with long slender branches, 18 inches long, lower spathe flattened slender with few or no thorns, upper ones and internodes with small recurved thorns, spathels roughly scabrid. Branches 1-2 inches long with short spikes ¼-½ inch long. Spathellules scabrid rough. Male flowers; calyx cylindric bluntly lobed ribbed. Petals 3 times as long, rather narrow, yellow white, Fruit ¼-⅜ inches through creamy white.

Selangor: Rawang (Ridley 7891); Perak: Batang Padang river (King's Coll. 8019); Chanderiang (King's Coll. 5659). Endemic and rare.

4. C. INSIGNIS, Griff. Calc. Journ. Nat. Hist. V. 58. Palm Brit. Ind. 69. Stems few 70 to 80 feet long ½ to ⅝ inch through, light green, sheaths armed with scattered thorns half an inch long or less, with broad conic bases and black tips; petiole 3 to 5 inches long, slender not swollen at the base, thorns slightly hooked; leaf blade a foot or more long, rachis slender, with sharp hooks pale at base, tips black, single or paired, leaflets 4 to 9 oblanceolate dark green, papery with a thickened edge cuspidate 8 inches long by 2 inches wide, nerves 6 or more, transverse nervules conspicuous when dry. Flagella very slender from the leaf sheath 2 or more feet long with no sheaths, thorns in groups of three, hooked (black-tipped). Spadix very slender 2½ feet long, armed with hooks, branches few 6 inches long with remote spikes an inch long. Spathes tubular slender, distant armed with hooks, spathels tubular with few or no thorns. Male inflorescence not known. Female flowers about 10 in a spike rather distant, spathels cup-shaped smooth with a round mouth. Fruit globose ¾ inch long, shortly beaked yellow, scales rhomboid in about 13 rows, convex edges paler. Becc. and Hook. fil. Fl. Brit. Ind. VI. 459.

C. spathulatus, Becc. and Hook. fil. l.c.c. (excl. var. *robustus*). Singapore: Bukit Timah, Bukit Mandai, Garden Jungle (Ridley); Johor: Panchur, Batu Pahat, Gunong Pulai (Ridley 11201); Malacca: Selandor; Dindings: Lumut (Ridley); Perak: Bujong Malacca. Endemic. "Rotan Batu." Common in forests all over the peninsula but

very rarely to be met with in flower. A much valued rattan. There is a short distinct ligule above the base of the petiole. The terminal leaflets are usually connate and the tips sometimes bristly. In the upper leaves the rachis is often continued into a short flagellum bearing a rudimentary terminal leaflet.

5. C. SUBSPATHULATUS, n.sp. Stem 20 to 30 feet long, $\frac{1}{2}$ to $\frac{3}{4}$ inch through. Leaf with a stout rachis armed with strong recurved black-tipped thorns; leaflets elliptic, narrowed at the base abruptly acuminate alternate 9-15 inches long, $2\frac{1}{2}$ to 4 inches wide, nerves numerous, nervules very numerous and conspicuous when dry, margin thickened, glabrous except the tip pencillate with black hairs. Male not known. Female spadix (fruiting) a foot long, very stout. Spathes unarmed $\frac{1}{2}$ inch long conic. Spikes about 24, 3 inches long stout. Calyx short enlarged at the base $\frac{1}{8}$ inch long, lobes short, sub-triangular. Petals lanceolate acute. Fruit (unripe) oblong with a long beak $\frac{1}{2}$ inch long, straw yellow, scales numerous, triangular, blunt edges scarious.

C. spathulatus var. *robustus*, Becc. Fl. Brit. Ind. VI. 459. Perak; Bujong Malacca (King's Coll. 7136, Curtis 3161); Kinta: (Kunstler). Endemic. I have not kept Beccari's varietal name for this, as for a rattan it is by no means robust.

6. C. RHOMBOIDEUS, Bl. Rumphia III. 60 pl. 154. Stem very long 30-40 feet and stout, over an inch through, covered with a white tomentum and armed with very short black thorns conic, pointing upwards. Leaf very long, petiole stout 20 inches long, $\frac{3}{8}$ inch through, covered with white tomentum and armed on the back with a few remote black conic recurved short thorns, solitary or in threes in the upper part, base gibbous; leaflets 8 to 14 in distant pairs, coriaceous, ovate acuminate, narrowed at the base 10 inches long, 6 inches wide, flocculent tomentose beneath or glabrous, nerves flabellate about 7 pairs margins and tip rachis setulose, rachis armed with hooks in threes and fours, flagellum 8-10 feet. Male spadix about 6 feet long, branches stout, spathes cylindric white tomentose unarmed or with a few short thorns. Spathels dilated upwards, with a short limb, spikes $1\frac{1}{2}$ inch long rather than short flowers distichous crowded. Spathellules flat ovate. Bract cupshaped. Calyx cupular, very shortly lobed. Corolla more than twice as long, petals narrowly oblong. Female spadix more lax, spikes longer, flowers more distant, spathellules longer, funnel-shaped. Fruit globose, $\frac{3}{4}$ inch long, dark brown scales broader than long, not grooved but marked towards the tip with faint concentric rings. Seed small as large as a large pea globose.

C. tomentosus, Becc. Fl. Brit. Ind. l.c. 455. Sungei Ujong (Cantley's Coll.); Perak: (Scortechini 431b); Larut Hills (King's Coll. 5332, 6993) (Ridley 11410). Forests at about 3,000 feet alt. "Rotan Tahi Ayam." Distrib. Borneo and Sumatra. I have taken the description

of the male flowers from Blume, as the peninsula plant described as *C. tomentosus* by Beccari is evidently Blume's plant.

7. C. SCIPIONUM, Lour. Fl. Cochin Ch. 1, 210. Climbing stems very large attaining 70 or 80 feet high, 2 inches through. Leaves 8 feet long, sheath green armed scantily with short, flat dagger-shaped yellow thorns, solitary and in threes. Petiole 1-3 feet long armed with distant flattened spines 1 inch long gibbous at base; leaflets broadly lanceolate 1-3 feet long, 2 inches wide, alternate distant. Flagella 12 feet long from the stem below the mouth of the sheath. Panicles very long, pendent, about 12 or more feet, rather slender, much branched. Males with strongly armed tubular spathes with rather distant strong hooks, spathels 1½ inch long, dilate upwards, base nude upper part with short hooks, branches 3 or 4 inches long with alternate distichous spikes ½ to 1 inch long, spathellules small funnel-shaped unarmed, edges fringed. Bracts circular. Flowers green ⅛ inch long. Calyx campanulate, ribbed, with a scarious margin and three short ovate lobes. Petals twice as long. Female spadix very long, spathels hardly armed, spikes 4 inches long. Bracts densely crowded, flowers distichous. Calyx as in male but gibbous at the base. Petals little longer. Fruit very small, ⅛ inch long, scales black or nearly so shining, in about 5 rows, hardly grooved, seed alveolate.

Lam. Encycl. VI. 304. Mart. Hist. Nat. Palm. III. 342. Kunth. Enum. III. 206. Griff. Calc. Journ. Nat. Hist V. 35. Palm. Brit. Ind. 43. Miq. Fl. Ind. Bat. III. 138. Hook. fil. Fl. Brit. Ind. VI. 461. *C. micranthus* Bl. Rumph. III. 53, t. 157. (excl. flowers and spadix).

Malacca: Ching (Griffith), (Ridley 11618); Selangor: Batu Tiga (Curtis 3765); Kwala Lumpur: (Ridley 1661); Perak: (Scortechini 501 b), Gunong Malacca (King's Coll. 7171). Dist. Borneo, Sumatra. The Malacca Cane; "Rotan Semambu," "Rotan Rajah."

In a plant in the Botanic Gardens, was unisexual the spikes containing males and female flowers in pairs.

8. C. ORNATUS, Blume. Rumphia. III. 58, t. 148. Roem. and Schultes VII. II. 1326. Stems very large, several together 60 to 80 feet long, 2 inches through dull green armed with broad flat thorns in threes. Leaves 12 to 15 feet long, base swollen and wrinkled; petiole stout and long 1 inch across, back rounded, armed with strong flat spines ¾ inch long or less, scattered; rachis armed with claws in threes or solitary scattered; leaflets in alternate pairs distant, lanceolate, narrowed at the base. 25 inches long 2½ inches wide above, green, more or less glaucescent beneath, many-nerved with transverse nervules tip setulose, few or no bristles elsewhere. Flagella very long from the sheaths, stout with strong recurved hooks in distant threes, leaves of young plants often flagelliferous, in adults terminal leaflets often abortive: Spadix very large 16 to 18 feet long. Spathes dilate upwards about 4 inches long limb acuminate 1 inch long, thorns scattered short

and strong in the upper part of the tube. Branches flexuous 6 to 7 inches long, stout. Spathels ¾ inch long, unarmed, mouth broad, rounded limb short. Spikes stout 3 to 4 inches long. Spathellules cup-shaped rather large ⅛ inch long with a short acute point. Bracts small ovate. Male flowers small crowded. Calyx small hemispheric, petals obliquely ovate, short. Female calyx short and broad, trifid half way, base truncate. Petals twice as long. Fruit large globose oblong 1½ inch long, with a short trifid beak. Scales about 10 rows broader than long, pale red tipped darker, tip blunt, deeply grooved at base. Griffith, Calc. Journ. Nat. Hist. V. 37. Palms of Brit. India 46. Mart. Hist. Nat. Palm III. 208, t. 116, f. 2. Miq. Fl. Ind. Bat. Supp. 256. Becc. Fl. Brit. Ind. VII. 460, (var. *horrida*). *C. giganteus*, Becc. l.c.

Singapore: Bukit Timah (Ridley 11481); Johor: Kwala Tebing Tinggi, Batu Pahat (Ridley 11202, 11203); Malacca: Durian Tungal (Fernandez); Negri Sembilan: Bukit Senaling (Moorhouse); Perak: (Scortechini 587b); Larut (King's Coll. 3931). Distrib. Sumatra and Java. Native name "Rotan Manau Kelichek." Beccari l.c. makes the Malay peninsula plant a variety *horrida* of the Javanese form, distinguishing it by its "glabrescent sheaths" (which as Blume says are quite glabrous) the seriate spines and adult leaves 3 or 4 costate and scarcely spinulose. The last two characters (of little importance) are well shown in Blume's figure, which well represents the peninsula plant. I fail to distinguish *C. giganteus* Becc. Young plants growing in Bukit Timah near the large plant identified as *C. ornatus* by Beccari (11481) have long flagella to the leaves. In neither plant are the under sides of the leaves glaucous in life, but plain green. The plant seems to flower very rarely.

8. C. MANAN, Miq. Fl. Sumatra 594. Stem very stout 1½ inch through. Leaf sheaths strongly armed with flat, acute black spines an inch long or less, in series, petiole very stout, black rounded, front flat, armed with short, strong thorns along the edge, base of petiole gibbous, margin of sheath prolonged into a short broad ligule; blade 6 feet long, ending in a strong flagellum armed with hooks in threes, rachis with strong short thorns, leaflets lanceolate, narrowed at the base a foot long, 3 inches wide. Panicle very large, spikes 6 inches long or less, sheaths of branches shortly thorny or smooth, wrinkled, limb ovate acuminate. Fruit large, subglobose oblong, distinctly pedicelled, an inch long scales in about 8 rows, large yellow or reddish, darkening towards the tips longer than broad grooved. Seed oblong, densely ruminated.

Negri Sembilan: Bukit Senaling near Seremban (S. Moorhouse). Native name "Rotan Manok Telor." Distrib. Sumatra.

9. C. DENSIFLORUS, Becc. Fl. Brit. Ind. p. 445. Stem 10 to 15 feet tall ¾ inch through light-colored smooth, with scattered flat acute thorns pale colored ¼ inch long, single or in rows of three. Leaf 6 to

8 feet long ; petiole short, rachis flattened above rounded beneath with large strong hooks black, usually in pairs, leaflets equidistant alternate linear acuminate 12 inches long ½ inch wide, 3 nerved with conspicuous transverse nervules, bristles on the nerves on both sides and tip. Flagellum from the sheath stout about 5 feet long armed with powerful light-colored thorns with brownish tips usually in pairs. Male spadix over a foot long, lower sheath thorny, peduncle long 6 inches long, sheath smooth, lower branches of inflorescence 3 inches long, bearing recurved alternate spikes 1 inch long or less. Flowers very close set distichous. Calyx saucer-shaped, shortly lobed, pubescent. Corolla oblong, short thick, quite blunt. Spadix terminated by a very long flagellum nearly 5 feet long. Female spadix 5-6 feet long, peduncle over a foot long, 1 inch through, light-colored, armed with triangular thick thorns often double, upper sheaths with a lanceolate limb and oblique mouth. Spathels close-fitting 1 inch or less, long unarmed. Spikes distant recurved thick 1½-3 inches long. Spathellules broad, red. Bracts 2. Flowers distichous alternate. Calyx tube very short, lobes ovate, longer. Petals acute little longer. Fruit ovoid beaked ½ inch long, scales in 11 rows longer than broad acute, yellow margins scarious, dark brown.

Singapore : Bukit Mandai (Ridley 6280) ; Garden Jungle (Ridley 9850, 10861) ; Perak : Thaiping (Kunstler 5527, 8434) ; Selangor : Kwala Lumpur (Ridley 3495), Kemaman (Vaughan Stevens), Batang Berjuntai (Ridley 7881). Native name " Rotan Chichi." The stem is indistinguishable from that of *C. Ridleyanus.*

10. C. RIDLEYANUS, Becc. Bot. Surv. Ind. II. 205. Stem about 30 feet long 1½ inch through, green covered with scattered thorns of different sizes, some 1½ inch long. Leaf petiole 6 inches or more long with spines on the edge scattered back round and smooth, with a shallow groove, sheath swollen and wrinkled ; blade 6 to 8 feet long, rachis with rather numerous hooks in threes or fours, leaflets equidistant, linear acuminate dark green 24 inches long, an inch wide, 3 nerves conspicuous when dry, bristles on the tip only. Flagellum from near the upper part of the sheath about 5 feet long, spines at the base numerous, scattered irregular straight, above distant hooked in threes with solitary ones intermixed. Male spadix unknown. Female spadix 8 feet long, peduncle 4½ feet. Spathes tubular with short scattered thorns, mouth oblique stem almost unarmed on the upper face thorns hooked in threes on the back. Upper spathe with a broad ½ inch long, thorny limb. Spathels infundibular thorny 1½ inch long, limb broad. Spikes recurved, 3 inches long. Spathels short cup-shaped scurfy.

Singapore : Garden Jungle (Ridley 11468) ; Mandai (3504) ; Johor : Gunong Pulai (12202). Endemic. The stem and foliage exactly resemble those of *C. densiflorus*, but the elongate inflorescence and spiny spathes and spathels and stout spikes make it quite distinct.

11. C. RADULOSUS, Becc. Fl. Brit. Ind. VI. 443. Stems 30 to 40 feet long, 1-1¼ inch through. Sheaths armed with numerous short triangular thorns. Leaf 3 to 5 feet long, sessile; rachis rounded with numerous crowded conic black tipped thorns, leaflets equidistant, narrow linear, base narrowed, tip acuminate 10-18 inches long ½-1 wide dark green, ribs 3 with a few bristles. Flagellum 5-6 feet long. Spadix female 8-10 feet long, peduncle 6 inches long almost covered with strongly rugose sheaths, 1 inch long, the upper ones similar enlarged upwards, (the rugosities consist of very short thorns with swollen bases with a large number of short processes mixed with them). Spikes 2 inches long ⅛ inch across, recurved. Spathels scabrid. Sepals rounded. Petals hardly twice as long. Fruit small pisiform, long beaked.

Perak: Goping (King's Coll. 8171).

12. C. RUGOSUS, Becc. Fl. Brit. Ind. l.c. 443. Stem 15-20 feet long ⅜ inch through dark green, covered with close transverse curved rough ridges bearing one or two short flat triangular thorns ⅛ inch long. Leaf 4 to 5 feet long, petiole 9 inches slender armed on edges and back with scattered short recurved black thorns, base not gibbous; leaflets about 24 pairs narrow linear narrowed at base and gradually to a long subulate point, bristles few except at the tip where they are slender and black, leaflets 9 inches long, ¼ inch wide. Spadices male very long and slender 3 feet or more long armed with numerous recurved black thorns. Spathes narrow tubular with a short limb, scabrid or lower ones shortly thorny. Branches 6 inches long, slender. Spathels resmbling spathes. Spikes ¾ inch long. Flowers ⅛ inch distichous. Spathellules ovate, nearly flat bracts similar but blunt. Calyx cylindric shortly bluntly trifid. Corolla twice as long. Petals narrow, oblong, blunt. Female spadix similar but rather stouter, rachis of spikes stouter ½ inch long. Fruit (hardly ripe) ⅜ inch long oblong beaked. Scales dark brown in 9 rows, smooth, margin darker, edge white laciniate, as broad as long.

Perak: Thaiping Hills at 3-4000 feet elevation abundant. (Ridley 11314-11315), (Curtis). Endemic.

13. C. LURIDUS, Becc. Fl. Brit. Ind. VI. 445. Stem slender 15 to 20 feet long, dark purplish when dry with strong broad thorns, dark green. Leaves 2½ feet long, petiole 6 to 12 inches long with decurved or straight remote black thorns; leaflets alternate remote subequidistant linear lanceolate nearly 2 feet long, ¾ inch wide acuminate subulate narrowed at the base, 3-nerved, edges and nerves setulose. Male spadix 4 to 6 feet long, slender, much branched, flagelliferous. Flagellum slender 15 inches long. Spathes long cylindric tubular, smooth unarmed. Internodes armed with black hooks. Spathels dilated upwards ribbed. Spikes ¾-1¾ inch long very slender, flexuous, Spathellules ovate subacute, bract saucer-shaped. Flowers not crowded, alternate, very small $\frac{1}{16}$ inch long. Calyx short campanulate, shortly bilobed.

Corolla hardly twice as long, obtuse. Female spadix shorter branches flexuous pendulous 6 inches, spikes deflexed distant 1½ inch long. Flowers distant spathellules longer. Calyx dilate at base and elongate. Petals free to base, acute. Fruit globosely ovoid, very small ⅛ inch long (but hardly ripe) yellow scales numerous longer than broad.

Singapore: Woodlands (Ridley 12607); Johor: Sungei Tebrau (Ridley 9207); Muar: Sungei Semangat (11300); Selangor: Rawang (Ridley 12118), (Fox); Perak: Kinta Valley (Ridley 9814); Larut Hills 3500-4000 feet (King's Coll. 284, 6284, 2647, 6400, 7203), (Ridley 11987); Negri Sembilan: Kwala Pilah (Moorhouse). Distrib. Borneo. Native name "Rotan Perut Ayam," "Rotan Kerai." The Rawang plant has transverse ridges like those of *rugosus*, but is I think *C. luridus*.

14. C. DIEPENHORSTII, Miq. Journ. Bot. Ind. I. 21. Palm. Arch. Ind. 27. Stem 20 to 30 feet long, stout. Leaves 3-4 feet long, petiole over a foot long, stout strongly armed, with flat acuminate spines irregularly scattered, ¾ inch long or less; leaflets 12 inches or more long, ¾ inch wide linear long acuminate with long scattered black bristles, on the 3 nerves and tip, edges thickened; rachis armed with stout black claws. Inflorescence large and decompound, sheaths copiously armed with black-tipped claws, lowest one with a long oblong lanceolate narrow limb, thorny, branches stout. Spathels in female spadix unarmed dilate upwards smooth with a short lanceolate limb, spikes stout 1-3 inches long. Spathellules funnel-shaped, short, with rather a large ovate limb. Fruit globose orange-yellow, shortly beaked, scales in 8 rows broader than long, edged brown, deeply grooved. Seed ruminate ovoid, slightly flattened. Miq. Fl. Ind. Bat. 594. Hook. fil. Fl. Brit. Ind. VI. 454.

Pahang: Tahan River (Ridley); Perak: Gunong Tambang Batok 500 to 2000 feet alt. (Scortechini 647b); Gunong Malacca and Thaiping Hills (King's Coll. 7201, 2552), (Ridley 11411, 11412); Dindings: Pangkor (Ridley 7898); Penang: (Wallich). Distrib. Sumatra. "Rotan Koman."

15. C. SINGAPORENSIS, Becc. Fl. Brit. Ind. p. 454. Stem about 20 feet slender ⅜ inch through green with dusky thorns in semi-circles. Leaf about 4 feet long, petiole 1 foot long armed with scattered short black thorns along the edge; leaflets subopposite linear acuminate pairs 1 inch apart, 8 inches long, ½ inch wide, bristles few or none except at the tip which is pencillate with black bristles. Flagella from sheath 5 or 6 feet long very slender armed with recurved black thorns, crowded at tip. Spadix male 6 feet long, peduncle 3 feet long, ¼ inch through, back rounded, margins back and front, armed with straight black spines, slender ¼ inch long or less scattered (9 to an inch) branches of spadix very slender 12 inches long, spathes and spathels tubular 1 inch long slender, unarmed, with a short limb. Spikes ½-¾ inch long. Flowers

distichous crowded. Spathellules cup shaped pale. Bract shorter cup-shaped. Calyx longer than bract, tubular, shortly trifid. Corolla small. Female spadix about 7 or more feet long, very slender with elegant pendulous branches a foot long, thorny, upper spathes very slender, unarmed 1½ inch long, dilate upwards, spikes short 1 inch long with 10 or 12 flowers. Fruit globose clear light yellow scales in 8 rows, as broad as long grooved. Seed small, slightly flattened elliptic in section, deeply ruminate.

Singapore: Garden Jungle (Murton) (Ridley 11459); sp. cult. H.B. S. from Singapore (Ridley 11515); Bukit Timah. Johor: Kwala Tebing Tinggi, Batu Pahat (Ridley 11206); Mt. Austin (Ridley 12590); Selangor: (Herb. Cantley); Perak: Kinta Valley (Ridley 9815); Dindings: Lumut (Ridley 10341); Penang: Muka Head (Curtis 765). Endemic in dense forest. Native name "Rotan lago." Used for tying thatch. Certainly near *C. Diepenhorsti*, but much more slender and smaller in all its parts. Curtis' plant is given as *C. Diepenhorsti* in Fl. Brit. Ind. but is undoubtedly *C. Singaporensis*.

16. C. PASPALANTHUS, Becc. and Hook. fil. Fl. Brit. Ind. VI. 450. Stem very long, ⅜ inch through, purple armed with flat olive-colored spines ¼ inch long, with an enlarged base. Leaves not flagelliferous 3 feet long; petiole over 18 inches armed with long slender horizontal spines 1¼ inch long, base gibbous; rachis covered with red scurf and peculiar red hairs; leaflets narrow linear finely acuminate, a few setae on the tip and numerous close set ones on the nerves beneath, 12 inches long, ⅜ inch broad, glaucous beneath. Flagellum 40 inches long, very slender with a long narrow sheath at base. Male spadix over 7 feet long, base very stout armed with powerful hooks and red scurfy, branches long, slender. Lowest spathe very long armed with short recurved thorns. Spathels very close fitting ending in a ligule sometimes as much as an inch long narrow linear, often much shorter and soon broken up into fibrils. Spikes ½ to 1 inch long, closely distichous. Spathellules closely imbricating ovate acute strongly ribbed or not. Bract cup-shaped, very deep. Calyx short tubular, hardly lobed. Corolla twice as long nearly ⅛ inch long. Female spadix stout and long. Spathes and spathels strongly armed with hooks, spikes stout over 6 inches long. Fruit globose shortly beaked ½ inch long, scales longer than broad bombed, dark red shining.

Johor: Batu Pahat (Ridley 11209); Serom (11213); Perak: Goping (Kunstler 577). Distrib. Borneo (Sarawak, Jambusan, Ridley 12403).

17. C. INTUNESCENS, Becc. (sub *Daemonorops*). Rec. Bot. Surv. Ind. II. 222. Stem long ¾ inch through, scabrid, brown when dry, with rather scattered flat triangular thorns ¼ inch long. Leaf 2 feet or more long, base of petiole gibbous thorny, petiole 9 inches long, edges and

back armed with short stout recurved thorns and scabrid; leaflets equidistant close, subopposite 7 inches long ¼-½ inch wide linear acuminate with short yellowish dark-tipped bristles on the three nerves and edge (disappearing in old leaves), a few longer ones on the tip; flagellum from the sheath long and very slender; rachis of leaf covered with the dark red appressed hairs, ocrea elongate, pubescent. Spadix male, very large 5 or 6 feet long, much branched. Spathes narrow cylindric with a short subacute limb, mouth edged with cilia, unarmed. Spathels similar short ¼ inch long, mouth ciliate, unarmed or with short recurved black thorns at base. Branchlets 6 inches long. Spikes distant ½ inch long. Flowers distichous close together. Spathellules very small, flat, erect. Calyx short cup-shaped, three lobed for ⅓ of its length ribbed. Corolla more than twice as long, narrow, petals narrowly oblong. Female spadix 3 feet long, little branched, slender, base armed with sharp slender spines. Spathes long, narrow, sparingly spiny, branches 2-4 inches long, spikes recurved, 1 inch long hairy flowers distant, pedicelled. Fruit oblong, ½ inch long, beaked, scales 10 rows, light brown edge darker, as long as broad.

Singapore: Bukit Timah (Ridley 10780); Johor: Batu Pahat (Ridley 11209); Selangor: Bukit Kutu (Ridley 7883); Perak: (Scortechini); Larut Hills (Ridley) at 2500 feet. Native name "Rotan Semiang."

18. C. RAMOSISSIMUS, Griff. Calc. Journ. Nat. Hist. V. 78. Palm. Brit. Ind. 87, t. 207. Stem 20 to 30 feet long 1-1½ inch. Petiole stout channelled with a thickened margin armed with flattened brown spines 3 inches long, and a few short ones mixed in; sheath covered with close appressed spines 4 inches long; leaflets inaequidistant lanceate to nearly linear 13 inches long, 1½ inch wide or less, nerves numerous, transverse nervules, conspicuous, tip setulose. Male spadix 2½ feet long, much branched. Spathes narrow flattened on one side and armed with short scattered spines, with a long lanceolate thinly coriaceous brown limb, the lowest one often 1½ feet long, ¾ inch wide, upper spathes smooth and shorter. Branches panicled spreading. Spathels cylindric obtuse with an ovate limb. Spikes ½ inch long, rachis flexuous scurfy. Flowers distichous ⅛ inch long. Calyx tubular with 3 ovate lobes obscurely striate. Corolla twice as long, lobes lanceolate acute shining. Female spadix shorter, branches fewer and thicker, simple. Fruit small globose, beaked, scales dark brown, broader than long grooved. Becc. and Hook. Fl. Brit. Ind. VI. 450. *Daemonops ramosissimus* Mart. Hist. Nat. Palm. III. 330.

Pahang: Pahang River at Kwala Tenok (Ridley); Perak: Gunong Keledang; Bujong Malacca (Ridley 9809); Goping (King's Coll. 545); Kinta (King's Coll. 7181); Larut (King's Coll. 2607); Gunong Hijau (Scortechini 51b 1235); (Ridley 11906); Negri Sembilan: Gunong Angsi (Ridley); Kedah, Gunong Jerai (Ridley). Endemic. From about 1000 to 5000 feet elevation.

19. C. MULTIRAMEA, n. sp. Stem ½ inch thick. Sheaths closely spiny, spines flat, some with a broad base tapering upwards 4 inches long others broad and short. Petiole flattened above, rounded beneath thorns scattered short and fairly thick with many small ones; rachis with many solitary curved hooks; leaflets linear narrow ¼ inch wide whitish, fluffy beneath, nervules conspicuous. Male spadix over 3 feet long, very slender, branches few distant about 6 inches long panicled slender with spreading branchlets. Spathes close fitting 9 inches long, thorny, with a very long thin papery limb 9 inches long ½ inch wide. Spathels slender with an ovate limb. Spikes short ¼ inch long alternate. Flowers distichous about 12 in a spike. Calyx tubular with three short ovate lobes, margins scarious. Corolla half as long again. Fruiting spadix very stout, limb of spathellules very large ovate. Fruit globose beaked less than ½ inch long. Scales rounded tip blunt, light brown with dark tips, grooved. Seed small, flattened on both sides, orbicular rugose, albumen not ruminate.

Perak: Dindings (Ridley 8405); Pahang: Kwala Luit (Ridley). Allied to *C. ramossissimus* but differing in the long slender thorny panicle and narrow leaves.

20. C. PERAKENSIS, Becc. Fl. Brit. Ind. VI. 451. Stem not very long 2-3 feet ½ inch through densely covered with broad flat brown thorns 4 inches long, base broad, and some broader and shorter. Leaf petiole flattened above, back rounded with short thick thorns based swollen scattered numerous; rachis with numerous solitary curved hooks; leaflets equidistant, close alternate, narrow linear 7-8 inches long, ¼ inch wide 3 nerved with conspicuous transverse nervules, edges and subulate tip setulose, young leaves white arachnoid beneath. Male spadix over 3 feet long, very slender. Branches few, distant about 6 inches long, panicled slender with spreading branchlets. Spathes 9 inches long or less, very slender, close fitting, thorny, limb long papery 9 inches by ½ inch across acuminate. Spathels slender with an ovate limb, spikes short alternate ¼ inch long, sometimes obscurely white tomentose. Flowers distichous about 12 in a spike. Calyx tubular with three short ovate lobes, margins scarious. Corolla half as long again. Female spadix shorter with fewer stouter and longer spikes. Fruit globose, beaked, less than ½ inch long, scales rounded, tips blunt, longer than broad, grooved, light brown with darker tips.

Selangor: Bukit Kutu, Bukit Hitam (Ridley 7879); Perak: Bukit Kapayung (Ridley). This plant very much resembles the Tenasserim *C. nitidus* Mart. (Wallich 8609).

21. C. LANATA, n. sp. A low growing rattan, leaves about 5 feet long, petiole over a foot long, elliptic in section armed with numerous very short thorns on the back, and short ½ inch, long thick thorns with a thick callus-like base, then slightly flattened and fringed with fibrous

processes on the edges, whole petiole when young covered with whitish appressed long irregular fibres; rachis armed on the back with three rows of similar hooks; leaflets sub-opposite or alternate, numerous 7 to 10 inches long, ¾ inch across linear acuminate with a long bristle-like point bearing a few bristles. Spadix male erect, 2 feet long, lowest sheath armed at the base with thorns like those of the petiole but smaller, and appressed, woolly, upper spathes similar, but very slightly armed with a few small thorns terminal ones unarmed. Branches 6 inches long with few erect branchlets 4 inches longer or less, spikes ½-1 inch long, rachis of all woolly pubescent. Spathels short, dilated upwards small, woolly. Bracts very small orbicular. Calyx cylindric with 3 acute points, ribbed with a scarious margin. Corolla short, acute less than twice as long, glabrous. Female spadix elongate lax 18 inches long, with few long branches with distant branchlets, bases of branches clawed. Spathels with a thin tubular and lanceolate limb, glabrous. Spikes distant, flexuous 4 inches long. Calyx and corolla very short as in male, young fruit globose, beaked, dark red, scales lanceolate, subacute, paler at base. Selangor: Semangkok Pass, at 4,000 feet alt. (Ridley 12116). Endemic.

22. C. CILIARIS, Bl. Rumphia III. 34, t. 147 and 163b, E. Stem 15 to 20 feet long slender or as much as half an inch through, sheaths scabrid with minute flat thorns, sometimes with scattered short thick thorns as well, dusky, ligule distinct ¼ inch long fringed with rather long hairs; petiole stouter, slender with a strong gibbous ridge at the base, scabrid, 3 to 6 inches long armed with slender, needlelike spines on the edge, rachis rufous, hairy; leaflets close equidistant, narrow linear acuminate 4-6 inches long ⅜-½ inch wide, covered with numerous white bristles. Male spadix erect, slender, 2 feet long, ending in a slender flagellum, little branched. Spathes tubular lower ones unarmed, upper ones with small hooked thorns, mouth ciliate, with a short, acute limb. Branches laxly panicled, graceful 4 inches long, rachis scabrid, spikes lax, flowers distant scorpioid. Bracts minute, ovoid. Calyx cup-shaped with ovate lobes. Corolla more than twice as long as calyx. Petals falcate. Female inflorescence usually much larger, much branched 2 feet long, lower spathe 6 inches long, thorny along the edge, median ones unarmed, upper ones armed with short hooks, branches 6 inches long, scorpioid with distant curved branchlets, spathellules trumpet-shaped, all scabrid. Calyx and corolla as in male. Fruit oblong, nearly an inch long, beaked, scales straw colored, at length fuscous, small, subacute deeply grooved, seed oblong, somewhat flattened with numerous very deep grooves radiating from the depressed centre. Albumen equable. Mart. Hist. Nat. Palm. *C. exilis*. Becc. Fl. Brit. Ind. VI. (in part).

Johor: Castlewood; Gunong Pulai (Ridley 12201); Pahang: Tahan river (Ridley); Perak: Thaiping Hills. Distrib. Java, Sumatra, Borneo.

23. C. EXILIS, Griff. Palm. Brit. Ind. 51. Stem 15-20 feet long, very slender. Leaves 3-4 feet long, petiole 6 inches long armed with recurved thorns on the edges; leaflets lanceolate linear, acuminate, with a long subulate point 6 inches long, ½ inch wide, 6 nerved, few irregular transverse nervules, sparingly setulose on the nerves or not, tip with pale bristles. Spadix male few-branched ending in a long slender flagellum armed closely with hooks. Spathes tomentose, narrow tubular mouth and ovate limb ciliate, armed or not. Branches flexuous, scabrid and tomentose. Spathels tubular dilated upwards tomentose. Flowers solitary or in pairs on the branchlets. Spathelulles short, ovate. Bracts as long. Calyx tubular, ribbed pubescent lobes ovate. Corolla twice as long. Female spadix longer, branches recurved, 2 inches. Flowers much more distant. Fruit oblong, pedicelled by the calyx, beaked ½ inch long, scales about 9 rows longer than broad, tip rounded, light brown. Seed flattened ovoid grooved.

Malacca: Mt. Ophir (Griffith), (Ridley 10118). Endemic.

24. C. CURTISII, n. sp. Stem half an inch through, sheath scabrid thickly armed with pale flat spines an inch longer or less; petiole 8 inches long triquetrous armed with straight pale needle-like spines on the edge: leaves 2 feet more long rachis red woolly, armed with small recurved hooks, leaflets narrow, linear acuminate, close equidistant with no bristles except at the tip. Male inflorescence 2 feet long, lower spathe margined with needle-like spines, upper ones nude below armed with hooks above, all ending in a lanceolate acuminate limb, scabrid or not. Branches 6 inches long spreading panicled scabrid. Branchlets numerous, slender, spikes 1½ inch or less slender. Spathellules funnel-shaped with an ovate acuminate limb, very small. Calyx tubular, broadly 3-lobed. Corolla twice as long. Female spadix stouter with scorpioid branches and distant flowers.

Selangor: Kwala Lumpur (Curtis 2392); Semangko (Ridley); Bukit Kutu (Ridley 7883). Endemic.

25. C. LOBBIANUS, Becc. Fl. Brit. Ind. l.c. 462. Stem short not climbing, 3 to 7 feet long, the rattan ½ inch through, green with short joints. Leaf sheaths short edged with a thin rugose portion, very spiny, with almost needlelike thorns, 3 inches long, green, spines darker. Leaf about 3 feet long, petiole 6 inches, the upper face with numerous black tipped thorns; rachis obscurely angled with curved thorns; leaflets lanceolate linear rather abruptly cuspidate deep green above, white beneath alternate or sub-opposite, with bristles on the nerves and tip 18 inches long, 1 inch wide, inflorescence-flagella slender about 4 feet long, green. Spadices with a peduncle a foot long or less, armed with long, narrow black spines ½ inch long, branches 3 or 4 stout distant spikes numerous, dense recurved. Spathes tubular infundibuliform with a lanceolate acuminate point, lower one covered with bristly spines, limb 3 inches or more long, upper spathes shorter and less spiny at the end of

the inflorescence and empty, very spiny abortive spathe. Male spadix with short dense recurved branches, the lowest about 4 inches, spikes distichous recurved, dense, an inch long or less, scurfy. Spathellules crowded, with an ovate limb. Flowers green, $\frac{1}{2}$ inch long, thick. Calyx lobes almost free to the base, oblong thick $\frac{1}{4}$ inch long striate. Petals twice as long, lower part striate apex obtuse, smooth, cartilaginous. Stamens 6 anthers linear $\frac{1}{8}$ inch long. Female spadix with longer branches. Spikes short, very crowded. Spathellules and flowers larger. Calyx mostly lobed. Fruit obovate, beaked black shining, over an inch long, scales ovate, rounded in 8 or 9 rows thin. Seed elliptic, nearly an inch long, pitted all over, alveolate.

Singapore: Bukit Timah (Ridley 8961), Bukit Mandai, Pulau Damar; Johor: Kampong Chinchin, Ulu Batu Pahat (Lake and Kelsall); Gunong Panti (Lobb); Selangor: Petaling; Pahang Track (Ridley 8776); Pahang: Pulau Tawar, Tahan River (Ridley). Distrib. Borneo. "Rotan Manana." Common in dry woods.

26. C. CONIROSTRIS, Becc. Fl. Brit. Ind. VI. 461. Stem 10 to 20 feet tall 1-1$\frac{1}{4}$ inch through. Leaf 6 to 8 feet long, petiole as thick as the middle finger, sparsely and shortly armed on the back. Upper spines of sheath acicular, 4 inches long; leaflets numerous, equidistant narrowly ensiform, tips slender strongly setulose, ribs 3, more or less setulose beneath green on both sides; rachis and flagellum armed with stout recurved bifid claws. Spathes copiously spiny, lower one 1 foot long. Female spadix very stout 2 feet long. Spathels densely spinous, spikes short and stout. Bracts large, densely imbricate cupular. Flowers large. Fruit 1$\frac{1}{4}$ inch long $\frac{2}{3}$ inch through, narrowly ovoid with a stout black beak, scales flat brown; black, smooth seed ovoid rough; albumen cancellate.

Perak: Goping, (King's Coll. 4593, 5808). Endemic. Very much like *C. Lobbianus*, but very much larger, and the leaves green on both surfaces.

§ 2. PHYLLANTHECTAE.

27. C. CAESIUS, Bl. Rumph. III 57. Stem slender glaucescent with distant flat pale thorns $\frac{3}{4}$ inch or less. Leaves hardly petioled, sheath gibbous, rachis slender with distant short thorns less than $\frac{1}{8}$ inch long, flagellum slender with very short recurved thorns in pairs on solitary length. Leaflets in distant alternate pairs, lanceolate narrowed at both ends 6-8 inches long by 1-1$\frac{1}{4}$ inch wide, pale green above white beneath, 3-6 nerved setulose at tips. Male spadix unknown. Female spadix, 6 feet long, stout, branched. Lower spathes 8 inches long or less tubular armed with very short thorns with conical bases; Spathels and spathellules infundibuliform, unarmed, mouths round ciliate. Bract large cup-shaped. Calyx short broad with short ovate subacute lobes. Petals little longer acute. Fruit oblong beaked $\frac{1}{2}$ inch long. Scales small in 9 rows yellow shining, bombed, longer than

broad, edge darkened, seed oblong deeply ruminate. Becc. and Hook. fil. Fl. Brit. Ind. VI. p. 453. Mart. Hist. Nat. Palm. III. 340. Miq. Fl. Ind. Bat. I. 6. *C. glaucescens*, Bl. l.c. 65. Mart. l.c. 339.

Muar: (Pears); Johor: Batu Pahat (Machado, Ridley 11382); Negri Sembilan: Kwala Pilah. (S. Moorhouse); Perak: (Scortechini). Distrib. Borneo and Sumatra. Native name, "Rotan Segar, Perak." A highly valued rattan cultivated by Malays in Sumatra, and Johor.

28. C. DISTICHUS, n. sp. Stem ½ inch thick, leaves over a foot long, sheath armed with flat spines half an inch long; petiole very short 1-1½ inch long armed with short strong spines on the edge; rachis slightly flattened with short thorns scattered over it; leaflets about 10 pairs, mostly in alternate pairs or in fours, two pairs opposite each other lanceolate acuminate, 6 inches long 1½ inch wide, acute not setulose; flagellum 8 inches long, strongly armed with hooks in pairs. Spadix 2 feet long, peduncle armed with horizontal straight spines half an inch long, flattened, sheaths elongate little or not armed, upper sheaths dilate upwards with a lanceolate limb. Spikes male distant 1½ inch long. Flowers closely distichous rather large, spathellules short and close, sheathing with a large limbed ribbed. Calyx tubular with three acute lobes and a scarious margin. Corolla twice as long, petals lanceolate obtuse. Female spikes longer with more distinct flowers.

Selangor: Hulu Semangkok (Ridley 12115).

29. C. PALUSTRIS, Griff. Calc. Journ. Nat. Hist. V. 62. Palm. Brit. Ind. 71, t. 199. Stem 30 to 80 feet long, 2-3 inches through. Leaves 8 to 12 feet long sheaths green with a few excavate thorn-like processes, or flat sharp spines, or nearly unarmed. Petiole gibbous at base with a single or double row of spines, rachis armed with black recurved hooks in distant pairs, leaflets alternate approximate in pairs, rather thin lanceolate 1-2 feet long 3-5 inches across, tip shortly acuminate bristly, many-nerved green (drying brown). Flagellum from end of leaf long. Spadix male long branched. Spathes tubular armed with short recurved hooks or nearly unarmed. Branches 6 inches long or less. Spathels unarmed, tubular mouth ciliate. Flowers distichous alternate. Spathellules cup-shaped. Calyx tubular swollen at base shortly lobed. Corolla twice as long. Fruit ellipsoid oblong rather glossy ½ inch long, scales trapezoid with a faint groove pale brown with a narrow blackish brown margin. Seeds almost semiconvex grooved and irregularly wrinkled. Mart. Hist. Nat. Palm. III. 339. Hook. fil. Fl. Brit. Ind. 11458. *C. latifolius*, Kurz. Journ. Roy. As. Soc. Beng. XLIII, II. 210, t. 31a (not of Roxburgh).

Negri Sembilan: Bukit Sulu (Cantley's Coll.); Perak: (Scortechini 50b). Distrib. Tenasserim, Andamans. Native names. "Rotan Kumbong, Rotan Sega Badak." Used in tying beams in houses. I have only seen male specimens.

30. C. BREVISPADIX, n. sp. Stem ½ inch thick densely armed with long flat acuminate thorns 1 inch long. Leaves long, petiole armed with broad flat dagger-shaped greenish spines, over a foot long stout, rachis rounded in section smooth with few scattered hooks; flagellum very slender with numerous small hooks in pairs; leaflets in sub-opposite groups of 4 to 6, with a nude space of about 6 inches between, elongate lanceolate 11 inches long ¾ inch wide, tip acute 5 nerved with a few very short bristles on the margin, and a few longer at the tip. Male spadix slender flowers acute. Female spadix 2 feet long or less erect, few branched, peduncle armed with short fine black thorns in tufts along the edge, sub-triquetous slender 8 inches long. Spathes unarmed papery, lowest one 3 inches long, with a lanceolate acute limb. Branches few 3 or 4 inches long. Spikes 2 inches long. Flowers rather distant. Spathellules short funnel-shaped with an acuminate point ribbed and ciliate on the margin when young. Calyx cone-shaped with broad lobes ⅛ inch long. Petals hardly longer. Fruit elliptic beaked ¼ inch long dark blackish brown. Scales about 6 rows as broad as long, tips blunt margin minutely lacerate deeply grooved (young).

Selangor: Semangkok Pass at 4,000 feet elevation (Ridley 12121). Endemic. In some of the leaves the leaflets appear to be regularly equidistant. The spikes when young have very ciliate spathels and spathellules but the hairs fall away as the plant grows.

31. C. ELEGANS, Becc. Mss. Stem "armed with numerous long pale straight spines." Leaf "petiole 3 inches long with straight spines ¼ inch long, with hooks on the back of the rachis; flagellum terminal 6 inches long with many hooks;" leaflets very inaequidistant in sub-opposite fascicles of 3 or 4 lanceolate linear acuminate margins scarious, nerves close, a few setæ on the tip 9 inches long nearly ½ inch wide: rachis brown scurfy. Male spadix very slender 18 inches long ending in a slender flagellum. Spathes unarmed slender tubular, limb very short rounded branches 2. Spikes solitary 3-4 on each branch about 1 inch long. Flowers about 12 small rather distant. Spathellules dilate upwards striate. Calyx cup-shaped short, lobes broad and short. Corolla lobes twice as long subacute not striate.

Perak: Bujong Malacca (Ridley); (Scortechini 316a); Gunong Bubu (Wray 3923). Wray's plant may not be the same. The passages in the description of the species in inverted commas are derived from his specimen. Scortechini's sketch in Kew Herbarium is labelled *Calamus Krai*. Endemic.

32. C. VIRIDISPINUS, Becc. Fl. Brit. Ind. t. 458. Stem 20 to 25 feet, not thick. Leaf sheath armed with very numerous flat green spines passing with bristles above; rachis triquetrous with scattered hook-like thorns ending in a flagellum 2½ feet long rather stout with hooks in distant pairs with solitary single hooks between; leaflets in distant fascicles lanceolate linear acuminate 10 inches long by 1 inch wide

nerves fine, transverse, nervules slender, a very few scattered bristles on the nerves. Male spadix long and slender over 4 feet long quite thornless except at the extreme base, branches long and few flattened, spikes curved 2 inches long. Spathes tubular lower one a foot long, limb lanceolate obtuse one inch long. Spathels cylindric with an oblique mouth. Spathellules very short. Flowers small quaquaversal. Calyx lobes ovate. Corolla lobes much longer ribbed. Female spadix similar very long. Calyx lobes rounded. Fruit small ellipsoid beaked ½ inch long scales broader than long grooved, light brown with a broad scarious dark brown edge. Seed oblong flattened, albumen not ruminate.

Perak: Larut Hills (5203, 3494), (11413, 11985 Ridley), also collected in the same place by Scortechini. Endemic.

33. C. OXLEYANUS, Teysm. and Binn. Cat. Pl. Hort. Bogor. 1886, 75. Miq. Arch. Ind. 17. Stem scandent about 20 feet long ½ inch through dark green with close set numerous thorns in bands and scattered 2 inches or less long narrow dark green the bases yellow. Leaves 4-5 feet long, flagelliferous; petiole six inches long smooth shining covered with scattered flat spines; leaflets in distant fascicles of 5 to 8 pairs linear acuminate deep green 8-12 inches long ½ inch wide with a few bristles on edges and nerves and more at the tip; flagellum rather slender 3 feet hooks recurved black-tipped. Male spadix slender 12-inches long. Lower spathes ampliate tubular 3 inches long with an acuminate limb 1 inch long, and an oblique mouth unarmed glabrous thin textured. Spathels similar shorter, ribbed, mouth ciliate. Branches few spikes very distant 1-2 inches long rather slender. Flowers distant. Spathellules nearly flat saucer-shaped acuminate thin, strongly ribbed. Bract ovate smaller. Calyx short campanulate, split for more than half its length into ovate blunt lobes strongly ribbed. Corolla short obtuse. Female spadix much larger and stouter, 3 feet long. Spathes smooth green as in male but larger. Internodes armed with half circles of hooks. Spikes 4 inches long, flowers distant alternate. Spathellules with a longer tube than in males. Calyx cylindric dilated at the base, cleft for more than half its length into 3 blunt lobes, strongly ribbed. Corolla barely longer. Fruit ½ inch long globose, scales rhomboid broader than long in about 6 rows, yellow turning brownish with a distinct brown margin, seed rugose, albumen equable. Becc. Fl. Brit. Ind. l.c. 458. *C. Fernandezii* Wendl. Kerch. Palm. 236. *Daemonorops fasciculatus* Mart. Hist. Palm. III. 330. Miq. Fl. Ind. Bat. III. 101, Griff. Palm. Brit. Ind. p. 95.

Singapore: Bukit Timah (Ridley 11473, 11619); Toas (6283); Johor: Gunong Pulai (Ridley 3719); Malacca: (Griffith); Griffith l.c. gives the name Rotan Pajare but it is Rotan Pujare on his ticket in Herb. Brit. Mus. I cannot find that any Malay knows it by any such name. He gives the length of the leaf as 10-11 feet, I never saw it as long. Endemic.

34. C. LONGISPATHA, n. sp. - A large stout rattan, leaves very large petiole short very thick ½ inch through nearly quadrate in outline, edge armed with short thorns, back with powerful hooks in pairs black-tipped; rachis and flagellum with powerful hooks solitary or in twos and threes; leaflets ensiform acute 26 inches long ¾ inch wide setulose only on the filiform tip. Spadix, female only seen, 8 feet long very stout, peduncle thorny, thick, woody, subtriangular. Spathes large lowest about 18 inches covered with short hooks with black tips. Spikes 2 inches long thick. Spathels strongly muricate (in Wray's specimen not in mine) dilate upwards. Female flower cylindric. Calyx dilate at base, lobes subobtuse. Petals nearly twice as long. Fruit large globose shortly beaked orange, scales broader than long deeply (obscurely Beccari) channelled.

Perak: Thaiping (Wray 2392, 3017); Gunong Keledang (Ridley); Selangor: 15th mile Pahang Track, near the Semangkok Pass (Ridley 8777). This is very little known, and all the specimens seem to differ from each other a little. The Selangor specimen has young fruit of a fusiform shape a little over ½ inch long, scales yellow with dark edges. This is I presume its young state, as the rest of the plant is indistinguishable from the Keledang one. Endemic.

35. C. PALLIDULUS, Becc. Flor. Brit. Ind. l.c. 457. Stem stout, light green ½ inch through with irregular thick short thorns in short rows. Leaf subsessile drying light green, rachis not very thick, triangular, with conic hooks solitary or in pairs black-tipped; leaflets alternate scattered not fascicled ensiform acuminate to lanceolate linear narrowed at base with a small swelling at the base on the rachis, glabrous many-nerved. Spadix large, lowest spathe with a few short thick spines, upper ones narrowed at base, dilate upwards 1 inch long, mouth entire with a short limb and some short rough thorns below the mouth. Branches over a foot long, spikes numerous, 3 inches long in fruit. Spathels short muricate ⅛ inch long, mouth rounded. Female flowers. Calyx dilate at base cylindric truncate, lobes short ovate, petals smaller. Fruit light fawn yellow, spherical with a short thick beak ¾ inch through, scales in ten rows, rhomboid as broad as long, edges brown.

Singapore: Jalan Bray (Ridley 6281). Endemic.

36. C. DIFFUSUS, Becc. and Hook. Fl. Brit. Ind. VI. 447. Leaves 2-3 feet long, not flagelliferous, petiole a foot long with a few thorns on the edge; rachis with a few black thorns recurved; leaflets narrow linear acuminate, equidistant close, 8-12 inches long ½ inch wide with three nerves sparingly setulose, and black bristles at the tip. Male spadix diffusely supra-decompound branches spirally inserted, lower spathe tubular green smooth coriaceous armed with hooked spines, upper tubular infundibular unarmed. Spathels short, broad. Flowwers crowded distichous. Calyx campanulate, striate. Corolla twice as long. Female spadix about 2 feet long, branches few recurved 8

inches long, lower spathes unarmed, thinly coriaceous. Internodes armed with short hooks. Spathels smooth infundibular tubular with a short distinct lanceolate limb and mouth ciliated. Spikes distant secund, 1½-3 inches long. Flowers distant, spathellules ribbed, rather long, limb ovate acute. Bract cup-shaped. Calyx strongly ribbed.

Singapore: (Lobb); Johor: Batu Pahat (Ridley 11215). This is very near *C. Oxleyanus* but the leaflets are equidistant. Endemic.

37. C. LAXISSIMUS, n. sp. Leaf rachis slender obscurely angled armed with stout solitary or paired hooks, leaflets ensiform with a long point, opposite, in distant pairs over a foot long ¾ inch wide, nerves 3 to 5, bristles a few on the edge and many on the point. Male spadix slender branched over 3 feet long, peduncle one foot long ⅛ inch across, flattened with needlelike thorns on the edge ⅛ inch long. Spathes long tubular thin lowest 9 inches long with a lanceolate thin limb, the mouth armed with erect slender processes an inch long, upper spathes similar but smaller. Branches slender 3-4 inches long. Spathels very short, funnel-shaped. Spikes very short, two-flowered, flowers ⅛ inch long. Calyx tubular base rounded, lobes ovate. Corolla but little longer obtuse, shining smooth. Female spadix 6 feet or more long, rather stouter, branches 6 inches stouter, spikes one to 8 or more, flowered. Calyx base dilate, rounded, tube cylindric, narrower, ribbed, lobes short. Corolla hardly longer. Stigmas rather long. Spathels scurfy.

Pahang: Tahan River (Ridley). A very curious plant, the very elongate branched spadix being nearly or quite unarmed. In one female spadix there are a few hooks below the spathes. The spathes have a lanceolate papery limb like those in *Ciramosissimus* but smaller, and some remarkable stiff flat processes, 6 inches long in the female along the edge of the mouth. The branches being covered closely with spathels and flowers might be taken for spikes but they bear very small two-flowered spikes, rarely more, and sometimes solitary flowers. Endemic.

38. C. AQUATILIS, Ridl. Journ. Roy. As. Soc. S. Br. Vol. 41, p. 43. Stem fairly stout, about 30 feet long covered densely with black bristle-like spines. Leaf long flagelliferous, sheath armed with copious black spines in short rows, petiole a foot long, stout back rounded, edge armed with spines of different sizes flattened and 2 inches long or less, spines at the base black, long and slender; rachis smooth on the back spiny on the edge; leaflets numerous equidistant linear acuminate, 1 foot long over an inch wide, bristles short along the edge and back scattered; flagellum 5 feet long, hooks in half whorls numerous. Panicles very large and stout, lower sheaths tubular an inch through with numerous short decurved spines singly or in twos and threes, black tipped, chiefly on the back and sides in the upper part. Branches about two feet, secondary spathes tubular unarmed an inch long. Male branchlets numerous, 6 inches long, spathels tubular short ⅛ inch, spikes

sub-distichous recurved $\frac{3}{8}$ inch long green. Flowers small distichous. Spathellules short saucer-shaped with an ovate limb. Sepals oblong lanceolate as long as the petals but thinner. Petals oblong lanceolate. Stamens, filaments, rather long slender, anthers long, narrowed. Female branchlets 2-3 inches long, spathels funnel-shaped, flowers solitary. Calyx lobes ovate as long as the petals and quite similar. Fruit small globular beaked $\frac{1}{2}$ inch long, scales in 6 whorls rhomboidal, as broad as long, yellow or brownish yellow, apex blunt, darker, grooved. Seed small, hemispheric base excavate, very rugose, albumen equable. Tidal swamps common, native name" Rotan Bakau." This has the appearance of one of the *Cymbospathe Daemonorops* from its densely black spiny stem.

Singapore: Serangoon Road, Changi (Ridley 6275); Johor: Panchur, Batu Pahat (Ridley 11216); Pahang: Kwala Pahang. Endemic.

39. C. DUMETORUM, n. sp. Stem stout moderately thick, leaves large, sheath armed with strong flat spines $1\frac{1}{2}$ inch long; petiole over a foot long, stout, back rounded upper surface flat, armed especially on the upper surface with numerous short flat pale spines; rachis with longer distant thorns along the edge, pale with darker tips and distant stout decurved hooks, leaflets distant elliptic lanceolate in pairs or solitary, 6 inches long 2 inches wide with short bristles scantily on margins and tip, base and apex narrowed pale beneath. Panicles large, 18 inches long, stout, lower spathe flattened thorny on the edge at the top, with a short lanceolate limb, upper ones dilated upwards ampliate with 1-3 thorns. Branchlets pendulous 4 inches long, spathes scurfy, pubescent. Spikes 1 inch long with close set alternate distichous flowers. Spathellules with a short tube and broad ovate acute ribbed pubescent limb. Bracts ovate ribbed. Fruit small.

Perak: at Lahat near Ipoh in open country (Ridley 11988); I only got male flowers and those young of this species. It is allied to *C. aquatilis*, Ridl. but differs altogether in the broad distant leaflets. Endemic.

40. C. CASTANEUS, Griff. Calc. Journ. Nat. Hist. V. 28. Palms of British India, 37, t. 185. A tufted bushy palm producing no long stems. Leaves very long, petiole stout with broad flat greenish spines in short curved transverse rows consisting of one long one over an inch long, and several short ones; rachis stout triangular with hooks in pairs; leaflets numerous equidistant linear 15 inches long, 1 inch wide, above green, greyish beneath, bristles $\frac{1}{2}$ inch long on the midrib on both sides and on the nerves, crowded at the acute tip. Spadices shorter than the leaves. Males longest and most slender over a foot long with several branches about 6 inches long and flexuous, spathes tubular dilated upwards, limb lanceolate acuminate with a very few soft spines or none. Spathels short tubular cuspidate, spikes about 4 inches long, $\frac{1}{4}$ inch wide, flowers distichous. Spathellules short, cup-shaped $\frac{1}{8}$ inch long.

Flowers ¼ inch brown. Calyx tube cylindric lobes lanceolate, acute short. Petals but little longer lanceolate acute. Female spadix shorter and stouter with a stout peduncle 6 inches long. Spathes shorter and broader. Spikes broader 4 inches long. Flowers larger, corolla but little longer than the calyx, pistil long with stout stigmas. Fruit ¾-1 inch long, oblong, ellipsoid, beaked, dark brown, scales rhomboid, grooved, broader than long in 18 to 26 rows, or fewer and larger, seed oblong flattened wrinkled albumen equable. Mart. Hist. Nat. Palm. III. 331. Miq. Fl. Ind. Bat. III. 112. Becc. Fl. Brit. Ind. l.c. 449. *C. Griffithianus* Mart. Hist. Nat. Palm. l.c. 332. *C. castaneus* var. A. Griff. Palm. Ind. 38.

Johor: Serom (Ridley); Malacca: Nyalas; Selangor, (Holmberg) Ayer Panas (Hervey); Selangor: Kwala Lumpur (Ridley 3477, 3478); Pahang: Tahan River (Ridley); Perak: Bujong Malacca (Ridley 9810); Kwala Lipis (Machado); Dindings: Lumut (Curtis 3454) (Ridley 9467). Endemic in forests. Native name "Atap Chuchur." The leaves used for thatching. The form with rather larger fruit *C. Griffithianus* grows with the common form.

41. C. TURBINATUS, n. sp. Stems long ½ inch thick. Leaf sheaths armed with flat, pale, dagger-shaped thorns in ascending lines, in upper sheaths smaller and more thorn-like, no ligule, petiole 6 inches or more long sparingly thorny along the edge, not gibbous at the base; blade about 4 feet long, leaflets linear acuminate 8 inches long, ½ inch wide alternate or sub-opposite numerous; rachis with distant small hooks, flagellum with few distant hooks. Inflorescences several from the upper part of the stem axillary, short and stout, 4 to 6 inches long, with very few branches, spathes funnel-shaped with an acute point, unarmed, branches stout 3 to 6 inches long, covered with short funnel-shaped spathels, scurfy edges pubescent. Flowers in pairs, peduncle shorter than the spathel. Bract at base of flower cup-shaped 3 lobed with gibbous bases, lobes rounded. Calyx lobes ovate acute, petals ovate much smaller. Fruit obturbinate, narrowed at the base, very shortly beaked at the broad top, scales very numerous, about 16 rows sub-triangular acute, grooved, cinnamon brown margined with a lacerate pale edge. Pericarp distinctly 3 celled when young.

"Rotan Relang." Negri Sembilan: Kwala Pilah (S. Moorhouse). *C. castaneus* but with a climbing stem, and very different fruits. Endemic.

Species Altogether Doubtful or Excluded.

C. Martianus, Becc. Fl. Brit. Ind. VI. 459, see under *C. Penangensis*.

C. neglectus, Becc. l.c. 458, founded on some unrecognizable scraps in Griffith's Malacca herbarium probably bits of *C. palustris*.

C. viminalis, Willd. Penang (Wallick 8611). This has never been seen again in the peninsula and is an Indian species; the locality is probably erroneous.

23. Plectocomiopsis, Becc.

Stout, often gigantic rattans with much of the habit of *Plectocomia*. Leaves pinnate large, flagelliferous, terminal leaves in one species at least reduced to sheath and flagellum. Inflorescence of numerous pendent panicles, unisexual on each plant, sub-terminal and causing the death of the stem. Spathels tubular, spathellules ovate, shorter than the flower, small. Calyx cup-shaped, shortly lobed. Corolla of three ovate lobes little longer. Fruit globose, green or brown, densely covered with minute acuminate scales with free points. Seed deeply pitted. Species 5. Martaban and Malay peninsula and Borneo.

Sheaths armed with long flat spines in semicircles.
Leaflets broad lanceolate ... ... 1. *P. annulatus.*
Leaflets narrow linear ... ... 2. *P. Scortechini.*
Sheaths covered with short conic scattered thorns ... ... 3. *P. geminiflorus.*

1. Pl. annulatus, n. sp. Stems 60 to 80 feet tall, 2 inches through, dark green ribbed, regular. Leaves 10 to 15 feet long, sheaths dark green with strong spines, 1½ inch long, flattened yellow in half rings about 12 together as in *Plectocomia*; petiole 2-3 feet long armed, with spines in threes; leaflets in alternate threes, lanceolate acuminate 12 inches long, 3 inches wide, dark green on both sides. Flagellum 2-6 feet long, stout, on the end of the leaf, armed with groups of hooks. Male inflorescences three feet long, pendulous, branches over a foot long, spathes tubular, 2 inches long with a lanceolate point, spathels an inch long, branchlets 3 inches long. Spikes ¼ inch long, recurved about 20 on the lower branchlets, bearing 16 flowers or fewer distichous. Bracts ovate, lanceolate. Bracteole opposite, nearly as large bilobed, with acute lobes. Male flowers not seen. Female inflorescence very stout, with branches 8 inches long, flexuous, spikes ½ inch long, 5-6 flowered. Bracts ovate woolly on the edges, ribbed. Flowers $\frac{1}{10}$ inch long. Calyx campanulate, deeply three lobed with ovate lobes. Corolla lobes little longer, ovate. Fruit sub-globose ½ inch through, brown entirely covered with minute lanceolate acuminate scales with free points.

Singapore: Botanic Gardens (Ridley 12500), Bukit Timah (11457) Bukit Mandai. This plant, especially when young closely resembles *Pl. Griffithii* Becc. Endemic.

2. Pl. Scortechinii, Ridl. A stout rattan 60 to 70 feet long, and one inch through. Leaves about 8 feet long, sheaths grey green terete, armed with spines in circles and semicircles, 1½ inch apart, spines 1½ inch long, yellow with red tips, petiole short, rachis armed with large

recurved hooks with broad bases, single or in pairs, sparsely brownish pubescent; leaflets in threes closely together linear acuminate deep green, not bristly, 7 inches long, ½ inch wide. Flagellum 2 feet long, hooks very close in groups of 6 almost surrounding the rachis. Inflorescence female about 2 feet long, branches recurved stout, 6 inches long, distichous remote. Spathes tubular striate 1-2 inches long, usually with a short limb. Spathels similar but smaller. Spikes ½ inch long recurved with about 6 secund flowers on each. Flowers nearly ⅛ inch long green. Calyx cup-shaped, lobes ovate, acute short. Corolla a little longer, all ribbed. Fruit globular, green an inch through, scales minute, acuminate, very numerous. *Myrialepis Scortechinii*, Becc. Fl. Brit. Ind. VI. 480.

Singapore: Bukit Mandai Road (Ridley 3503, 5860); Perak: (Scortechini). Endemic. "Rotan Rajah," "Rotan Kirtong." In habit, armature and foliage this much resembles *Plectocornopsis annulatus* and the fruit is quite similar.

3. Pl. geminiflorus, Becc. Fl. Brit. Ind. VI. 479. A gigantic plant with stems 60 or more feet tall and 2 inches through, light green, scurfy and sprinkled over with many short conic, acute, pale thorns irregularly placed. Leaves very large, petiole stout an inch across, edged and keeled with short conic pale thorns; rachis armed with distant hooks; leaflets alternate regularly lanceolate a foot long, 1½ inch wide, narrowed at the base with a yellowish thick pulvinus tip long acuminate, no bristles, terminal leaves reduced to sheaths with a few very narrow linear setiform leaflets, and a flagellum 6 inches or more long, with rather distant short, pale hooks. Panicles nearly 2 feet long, or less, with very numerous slender flexuous branches 8 inches or more long, spikes alternate recurved ¼ inch long. Flowers secund. Spathes and spathels tubular, with an acuminate lanceolate limb, which is finely hairy on the edge. Bracts small, ovate acuminate pubescent. Flowers male, about 12 in a spike. Calyx cup-shaped with short lobes, corolla twice as long. Female spadices simple, long branches very short, enclosed in a cup-shaped spathel. Young fruit globose, scales small brown with whitish edges. *Pl. Wrayi* Becc. Fl. Brit. Ind. l.c. 480. *Calamus geminiflorus* Griff. Palm. Brit. Ind. 70, t. 199, A.

Malacca: (Fernandez); Selangor: Rantau Panjang (Ridley 12119); Perak: Sungei Larut (Wray 2421). Griffith's original plant is a female one and no other females have been described. The others are all male. There is a considerable difference between the form of the inflorescence in the two sexes, but as the stem and leaves and general form of the plant is exactly similar in both, I have no doubt as to their being the same plant, especially as quite similar sexual differences occur in *Pl. annulatus*.

24. Korthalsia, Bl.

Climbing palms with pinnate flagelliferous leaves, sheaths thorny or smooth, ligule often developed into a swollen amplexicaul body

serving as a nidus for ants (ochrea), petiole usually short, leaflets rhomboid, cuneate or lanceolate cuneate. Inflorescence sub-terminal of several branches with tubular spathes and pendulous cylindric dense spikes, covered with short truncate rounded bracts thickly woolly inside. Flower spike bisexual. Calyx saucer-shaped or cupular, three lobed, hidden in the wool. Corolla with a short tube and oblong petals. Stamens with short filaments adnate to the mouth of the corolla tube. Anthers longer, oblong. Pistil shorter, ovary conoid, scaly 1-3 celled. Style one conic. Fruit one seeded oblong or ovoid, scaly, scales regularly arranged of moderate size. Seed erect, ruminate. Species about 20. Burmah, Andamans and the Malay Archipelago. Ochrea inflated.

Ochrea elliptic, black spiny	1. *K. echinometra.*
Ochrea cymbiform thorny.	
Leaflets rhomboid	2. *K. scaphigera.*
Leaflets linear-lanceolate	3. *K. Scortechinii.*
Ochrea cylindric.	
Leaflets cuneate rhomboid	4. *K. Machadonis.*
Ochrea not inflated.	
Stems very large, sheath armed. Leaves cuneate rhomboid.	
Ochrea short. Petiole callused at base ...	5. *K. Wallichiaefolia.*
Ochrea 5 inches long. Petiole not callused ...	6. *K. grandis.*
Stem moderately stout. Leaflets trapezoid	7. *K. ferox.*
Stem very slender, leaflets obovate ...	8. *K. tenuissima.*
Sheath unarmed, spikes slender	9. *K. polystachya.*
Leaflets narrow elongate, 3 inches long ...	10. *K. flagellaris.*
12-18 inches covered beneath with red pubescence	11. *K. rubiginosa.*

1. K. ECHINOMETRA, Becc. Malesia II. 66, t. 7. Stem about 100 feet long ½ inch through. Leaves 8 to 10 feet long. Ochrea oblong about 4 inches in length, 1¼ inch through armed with slender black needle-like spines, 3 inches in length, petiole spiny on the edge leaflets about 26 in number, linear lanceolate acuminate, over 12 inches long, 1 inch wide, backs white, occasionally sparingly setulose above. Flagellum long, slender. Inflorescence large and stout, branches 6 inches and more long, stout; spathes tubular, mouth with a large lanceolate limb, spikes 4 to 6 inches long, ¼ inch thick pendent. Bracts suborbicular ribbed, densely covered by the ferruginous wool. Calyx lobes, ovate subacute, small. Petals orbicular. Fruit oblong, beaked distinctly cinnamon brown ½ inch long. Scales rhomboid blunt, elevated in the middle, margins lacerate. Becc. Hook. fil. Fl. Brit. Ind. VI. 474.

Singapore: common, Bukit Timah, Chan Chu Kang (Ridley 3521); Nergi Sembilan: near Seremban (S. Moorhouse), Bukit Kandang (Cantley); Perak: Larut Hills to about 1,500 feet alt. (Scortechini, Ridley). Native name "Rotan Hudang." Distribution Borneo.

2. K. SCAPHIGERA, Mart. Hist. Nat. Palm III. 211. Stem slender 30 to 60 feet long, ½ inch through, yellowish green sheaths sprinkled with short thorns, ochrea swollen oblong elliptic, cymbiform 1½ inch long to 3 inches. Leaf about 3 feet long, upper ones ending in a very slender flagellum 3 feet long, armed with numerous small hooks 1 to 3 in a group, lower leaves ending in a double leaflet; leaflets 12 subopposite cuneate, whitish beneath with a short petiolule, nerves 7; 6 to 7 inches long, 2 inches wide; petiole 3 inches long. Inflorescence about a foot long with few branches, lower spathes tubular with a few short thorns, upper ones smooth, with a short limb, spikes decurved 8 inches long, ¼ inch through, cylindric. Bracts short, broad ovate. Flowers spirally arranged, orange. Calyx lobes ovate, very small, concealed in the wool. Corolla split almost to the base ⅝ inch long, oblong obtuse. Stamens almost as long adnate at the mouth of the tube; filaments very short cuneate, anthers linear, oblong pink. Ovary conic, sunk in the wool. Styles forming a cone. Fruit oblong ½ inch long, beaked yellow, scales as broad as long hardly grooved. Seed oblong ellipsoid, albumen ruminate.

Miq. Fl. Ind. Bat. III. 750. Palm. Arch. Ind. 26. Becc. Malesia II. 67, t. 5. Becc. and Hook. fill. Fl. Brit. Ind. VI. 475. *K. Lobbiana*, II. Wendl. Bot. Zeit. XVII. 174, Miq. l.c. *K. rostrata*, Bl. Rumphia, II. 168. *Calamosagus scaphigera* Griff. Palm. Brit. Ind. 30, t. 184 A. Kurz. Flor. For. II. 513.

Singapore: Garden Jungle (Ridley 9217), North Selitar, Bukit Timah common (Ridley 6272); Malacca: (Griffith), Sungei Udang (Goodenough 1704); Sungei Ujong: (Cantley's Coll.); Perak: Asam, Kumbang (Wray), Larut (King's Coll. 3722, 6833, 8144). Endemic, in woods common. "Rotan Semut." Ant-Rattan, so named from the ants which inhabit the swollen ochreae. The rattan is valued on account of its small size and strength.

2. K. SCORTECHINII, Becc. Fl. Brit. Ind. l.c. 475. Leaflets 14-16 to 2 inches alternate linear or cuneately oblanceolate 8 to 10 times longer than broad equidistant, white beneath 5-7 nerved acutely toothed, sheath and ochrea 6-8 inches long around, with short scattered spines.

Perak: (Scortechini). I have not seen this.

3. K. MACHADONIS, n. sp. Stem slender, ochrea cylindric 1½ inch long thorny, petiole a foot long, very thorny, with short thorns crowded white, with a scurfy meal when young; leaflets alternate remote 12, the two lowest smallest, the terminal ones connate broad, the others

cuneate, rhomboid bidentate with a long point, 6 inches long and 3 inches wide, no petiole.

Perak: Kamuning (Machado). A young plant sent by Mr. Machado is very different from *K. scaphigera.*

4. K. WALLICHIAEFOLIA, Wendl. in Kerchoff. Palm. 248. Becc. and Hook. fil. Fl. Brit. Ind. VI. 475. Stem 100 feet or more long, an inch and a half through, whitish. Leaves rather distant, ochrea short, tight fitting, about an inch long ending like the whole of the sheath edge in a network of brown fibres, back of the sheath glaucous, armed with scattered conical thorns in pairs or single; petiole flattened, armed with strong conic recurved thorns on the back and edge; a thick semicircular blackish green callus at the base of the petiole between that and the sheath, leaflets distant broadly obovate cuneate, obtusely toothed, dark green above, glaucous white beneath, 8 inches long, 5 inches wide, about 14 in number with short ½ inch thick, swollen dark green petiolules, flagellum very long. Spadix very large, spikes over 6 inches long, thick lateral, pedicels plano-convex, with a long spathe about the middle reaching the base of the spike. Bracts broad, ribbed, longer than the wool. Becc. Malesia, 11, 75. *Calamosagus Wallichiaefolius* Griff. Calc. Journ. Nat. Hist. V. 24, Palm. Brit. Ind. t. 184. *C. Harinaefolius* Griff. in Text p. 29.

Singapore: Bukit Timah, very common (Ridley 10407); Johor: Kwala Sembrong (Lake and Kelsall); Malacca: Kussan (? Kesang) (Griffith). Common as this huge species is it seems almost impossible to get flowering specimens. I have sought them in vain. A fallen spike picked up by Mr. Kelsall seems to belong to this species.

5. K. GRANDIS, n. sp. Stem 50 feet long, 1½ inch through. Leaves very large, 10 feet long, sheath smooth, almost unarmed, except for a few short conic thorns on the back, ochrea 5 inches long, oblong, rounded at tip; petiole a foot long, not gibbous or callused at the base, with a few distant, short conic thorns on the edge, leaflets distant, broadly cuneate, obovate bright green, white beneath 10 inches long, 5 inches wide, narrowed at the base into a flattened petiole, orange colour, margin above toothed the median tooth acuminate, the longest leaflet near the spadix and the lower part of the leaf, often much narrower elongate cuneate 8 inches long, 1½ inch wide, flagellum long. Spadix 4 or 5 feet long, with branches 2 feet long, woody subangled, spathes tubular, with a short round limb, spikes decurved 4 to 8 inches long, ½ inch through, bracts rounded, strongly ribbed, wool nearly as long as the bracts.

Singapore: Selitar, Bukit Mandai. Near *K. Wallichiaefolia* but differing in the large ochrea, not reticulate.

6. K. FEROX, Becc. Males. II. 73. Stem 20 to 30 feet long, moderately stout. Leaves 1½ to 2 feet long, sheath armed with short conic thorns, ochrea not swollen, ½ inch long; rachis fairly slender with

strong recurved thorns, rather numerous ; leaflets trapezoid, 5 inches long by 3 inches wide, base narrowed into a petiolule ½ inch long, margins dentate, green above paler beneath ; flagellum rather stout, hooks recurved, stout, numerous and close in groups. Inflorescence about 6 inches long, spathes about 1½ long smooth, dilated upwards, mouth oblique. Spikes 3½ inch long stout covered with brown fur, but less furry than those of *K. scaphigera*. Calyx lobes projecting beyond the bracts ovate ribbed. Petals oblong, ⅛ inch long.

var. *Malayana*, Hook. fil. Fl. Brit. Ind. VI. 476. Spines of the sheath and ochrea shorter and covering the ventral face of the latter.

Perak : Larut (King's Collector 6563), Gunong Hijau, Larut Hills (Scortechini) ; Penang Hill (Ridley). Very near to *K. polystachya* but the spikes are stouter and the sheath more thorny. Distrib. Borneo.

7. K. TENUISSIMA, Becc. Males. II. 275. A long slender rattan up to 100 feet long, stem smooth ⅛ inch through. Leaves 9 inches long, rachis slender flagellum long and slender, sheath smooth ribbed ; leaflets about 6, cuneate obovate or oblanceolate acuminate pale beneath, 4 inches long by 1 wide tapering at the base into a petiole ¼ inch long, ochrea not dilated, tubular, ¾ inch long margin scarious. Spikes few, stout 1½ inch long. Bracts woolly but less so than in most. Calyx cupular, shortly lobed. Corolla nearly ¼ inch long, lobes oblong. Hook. fil. Fl. Brit. Ind. VI. 476.

Perak : Larut, in low ground at 300 feet elevation (King's Coll. 4057).

8. K. POLYSTACHYA, Mart. Hist. Nat. Pal. III. 210, t. 172, f. I. Stem ½ inch through, leaf sheaths smooth, unarmed white scurfy, ochrea close fitting, papery terete ½ inch long ; petiole slender, 2-3 inches long with a few scattered hooked thorns on the back ; rachis ferruginous, scurfy with thorns 1-3 together ; leaflets with petiolules an inch long, red scurfy, blade obcuneate cuspidate denticulate 7 inches long, 4½ inches wide, or less, green above pale beneath, very variable in size. Flagellum slender 2 feet long, scurfy, hooks numerous. Inflorescence large unarmed, about 2 feet long with several branches, spathes tubular, close fitting 3 inches long, nearly ½ inch through. Mouth oblique, reticose, scurfy, branches a foot long, spikes shortly peduncled, deflexed slender, 6 inches long, ⅛ inch through. Bracts short, ovate, longer than the wool. Flowers ⅛ inch long. Calyx very short, lobed. Petals oblong, yellow, twice as long. Stamens shorter. Fruit ⅜ inch long, oblong ; scales longer than broad in 7 rows, bombed and deeply grooved. Miq. Fl. Ind. Bat. III. 77. Becc. Malesia II. 74. Hook fil. l.c. 476. *Calamosagus polystachyus* Griff. Mart. 211. *C. ochrigr*, Griff. Palm Brit. Ind. X. t. 216, p. 31.

Singapore : Bukit Timah (Ridley 6671, 8982) ; Johor : Batu Pahat (Ridley 11208) ; Malacca : (Griffith).

9. K. FLAGELLARIS, Miq. Journ. Bot. Neerl. 15. Fl. Ind. Bat. Suppl. 255, 591. Leaves 12 inches long, sheath very spiny, petiole long and stout, 5 inches long, $\frac{1}{4}$ inch thick; rachis stout with powerful hooks 1 inch part; leaflets obcuneate, 3 inches long by 1 inch wide with few strong teeth, crowded, red tomentose beneath, petiolule thin and flat; flagellum very long and stout, claws in threes, ochrea armed ventrally. Branches of inflorescence 9 inches long, spikes 3 to 4 inches long sessile. Bracts broad truncate shorter than the red wool between them. Petals ovate blunt (in fruit). Fruit very young, yellow, short beaked, scales in 9 to 10 series, fimbriate. Hook. fil. Fl. Brit. Ind. VI. 476. *K. angustifolia* Miq. Palm. Arch. Ind. 15, 26. (not of Blume).

Perak: (Scortechini) Asam Kumbang (Wray 3127). Distrib. Sumatra.

10. K. RUBIGINOSA, Beec. Malesia II. 72. Stem tall and stout, $1\frac{1}{2}$ inch through. Leaves large, sheath thorny with short thick conic thorns, straight on the back, lacerate into fine red, brown fibres, ligule 4 inches long lanceolate oblong; petiole over a foot long or less, armed with short straight thorns on the edge, in the upper leaves more thorny, inner face and back armed with numerous thorns in groups or single; leaflets linear oblong 12-18 inches long, $1\frac{1}{2}$-nearly 2 inches across, base gradually cuneate ending in a flattened petiole $\frac{1}{2}$ inch long, tip toothed acuminate teeth, spinescent above green plicate beneath covered with a close cinnamon red scurf, making the plant very conspicuous, rachis with small hooks or nearly unarmed. Inflorescence a foot or more branches bluntly angled, woody, not very thick. Spikes 3 inches thick, $\frac{1}{6}$ inch through, woolly. Bracts ovate ribbed. Calyx lobes small ovate, orbicular. Petals ovate, ribbed longer.

Johor: Mt. Austin (Ridley 12591); Mt. Soga, Batu Pahat (11214). I have often seen this conspicuous plant in Selangor and Perak, but failed to find any inflorescences except that of one plant which had been felled and was nearly rotten. I have no doubt that it is the plant described partly by Beccari from Borneo.

25. PLECTOCOMIA, Mart.

Gigantic climbing unisexual rattans, the stems thickening upwards from comparatively slender bases. Leaves very large, flagelliferous with broad leaflets. Inflorescence subterminal of long pendulous spikes covered with broad imbricating bracts, almost concealing the small panicled or spicate flowers. Male spikelets many flowered. Flowers small. Calyx cupular shortly 3 toothed. Petals oblong free almost to the base. Stamens 6 to 12 filaments very short. Anthers linear. Female flowers large and fewer, pedicellate; staminodes 6 or none. Styles stout, ovary three-celled. Fruit globose, 1 to 3 seeded, pericarp with dark brown triangular scales with a free recurved point. Seed solitary, albumen equable. Species 5 or 6 Indo-Malayan.

Pl. Griffithii, Becc. Fl. Brit. Ind. VI. 478. Stems 100 feet long, 3 inches in diameter above. Leaf sheaths dark green, ribbed with strong red spines, 3 inches long in rows of 5 to 7 on the back, margins and mouth; petiole stout 8 inches long, back rounded channelled above leaf 20 feet long, rachis (nearly white when young) stout with a few scattered thorns; leaflets elliptic acuminate base narrowed, dark green above, pale beneath, 12 inches long, wide, arranged in distant fascicles of 2 or 3; flagellum very long and thick, armed with powerful hooks in groups. Spikes of inflorescence 6 feet long. Males, bracts nearly 2 inches long, broadly ovate, sides angled, dark brown striate, edges pubescent, spikelets 1 inch long, rachis pubescent. Flowers nearly $\frac{1}{4}$ inch long, yellow. Calyx short, lobes, hardly distinct acute, edges pubescent, ribbed. Corolla split, nearly to the base, lobes oblong acute, ribbed falcate, 3 times as long as the calyx. Stamens 6 filaments very short, anthers linear. Female bracts smaller, spikelets more slender and denser. Flowers much larger $\frac{3}{8}$ inch long, about 4 in number. Calyx large, cup-shaped, shortly lobed thick hardly ribbed. Corolla lobes oblong acute twice as long, styles longer than the corolla. Fruits globose, several in a bract, dark brown, as large as a bullet, (12 bore). Scales triangular, with a long red point, margins lanciniate and fimbriate. Styles persistent. *P. elongata*, Griff. in Calc. Journ. Nat. Hist. V. 96. Palm. Brit. Ind. 104, t. 217 A. B. C. (not of Blume). Common all over the peninsula ascending to 300 feet elevation.

Singapore: Garden Jungle (Ridley 3487), Bukit Maudin Road (3470), Kranji Selitar (1665); Malacca: Kunder (Griffith) Mt. Ophir at 3000 feet elevation. Perak: Gunong Keledang (Ridley); Penang Hill at 2000 feet elevation (Ridley 7098, Curtis 1669). Native name "Rotan Dahan." This rattan is only used for legs of long chairs, mining baskets, etc., and is very little valued. It is abundant in the lowland forests, and owing to its great weight frequently brings down trees of considerable size by climbing on them. The immense climbing stems die completely after flowering.

Pl. elongata, Mart. Roem. and Schult. Syst. VII. 1333. Hist. Nat. Palm. 199, t. 114, and 116. fl. A Japanese plant, differing in its pale colored bracts acute and sublobed, and fewer and larger fruit. It is recorded from Penang collected by Jack and Wallich on the authority of Martius, and by Curtis, Beccari in Fl. Brit. Ind. VI. 479. I have nowhere seen it. The plant collected by Curtis is certainly *P. Griffithii*, and the others probably the same.

26. Borassus, L.

Stem tall, stout, solitary unarmed. Leaves very stiff, fan-shaped, multifid, petiole spinous or not. Spadices very large simply branched. Peduncle sheathed with open spathes. Male spadix with many branches, cylindric, stout, covered densely with umbricating bracts enclosing spikelets of minute flowers. Sepals concrete 3 tip inflexed truncate.

Petals shorter obovate, spathullate truncate. Stamens 6, anthers subsessile, oblong. Female spadix few branched, flowers scattered, flowers large globose. Sepals reniform, petals smaller, convolute. Staminodes 6-9; ovary globose, sub-trigonous, 3-4 celled. Stigmas 3 recurved sessile. Fruit a large globose drupe, with 1-3 obcordate fibrous pyrenes, seeds oblong, albumen equable. Species 2, one African, cultivated (possibly wild in India) throughout the East, the other Malayan.

B. MACHADONIS, Ridl. Journ. Roy. As. Soc. S. Br. Vol. 44, p. 203. Stem tall and nearly as thick as a cocoanut palm, ringed. Petioles 12-15 feet long, $1\frac{1}{2}$ inch thick unarmed, deeply channelled, blade suborbicular, 4 feet across, 6 feet long, split nearly to the base, into linear acuminate lobes. Male inflorescence of three cylindric catkins, 14 inches long, $1\frac{1}{4}$ inch thick. Bracts oblong, limb ovate, obtuse. Calyx 3 lobed, $\frac{1}{4}$ inch long, as long as the bract, lobes oblong, unequal, one broad and rounded at the top, the others acute, split. Corolla lobes 3 linear narrow, edges fringed $\frac{3}{8}$ inch. Stamens, filaments short, anthers long, linear acute. Female spadix 12 inches long. Peduncle 3 inches. Flowers about 20, terminal portion of spadix sterile. Bracts 2 broadly semicircular 1 inch long, edges lacerate, orange brown outside, yellow inside. Fruit obovoid. Pyrenes 3 oblong, woody, 3 inches long, 1 inch through covered with rough brown hair.

Perak: in dense forest at Kamuning; Sungei Siput (Machado) "Chang-hai." Distrib. Siam. The whole of the rest of this section of palms is confined to Africa, and its islands.

B. FLABELLIFER, L. sp. Pl. 1187. The "Lontar" of Malacca, or Palmyra palm, is occasionally to be found in the vicinity of temples and towns near the sea, having been introduced by Hindus, and is said to have established itself in some quantity in Kelantan. Its native name Lontar is derived from an old word Lon for Pohon (tree) and Tah, a perversion of Tal, the Hindu name for the plant.

XX. PANDANAE.

Unisexual shrubs or trees erect and branched or scandent with aerial roots. Leaves usually in a spiral, narrow linear or lorate acuminate, coriaceous, often very long; margins and keel usually armed with spine-like teeth. Spikes axillary or terminal, simple or branched with leaf-like bracts. Flowers small, numerous, crowded. Perianth absent. Male flowers of numerous stamens with free or connate filaments anthers erect basifixed. Pistillode small or none. Female flowers with or without staminodes. Ovary one-celled free or connate with those of adjoining flowers. Stigmas sessile. Ovules solitary and suberect or many parietal. Fruit a globose or cylindric mass of one or more-celled woody or fleshy angular drupes, free or several connate. Seeds minute.

Stems erect. Carpels 1 ovuled ... ... 1. *Pandanus.*
Stems scandent. Carpels many ovuled ... 2. *Freycinetia.*

1. PANDANUS, L.

Trees or shrubs erect branched with stout aerial roots. Leaves long and broad or narrow. Male spadix branched deflexed. Staminodes in female flowers absent. Carpels 1 ovuled. Species numerous tropical. A difficult group to work out as male flowers in many species are quite unknown and very rarely met with and the descriptions of many species are far too inadequate to identify the plant with.

§ 1. KEURA. Drupes plurilocular ... 1. *P. fascicularis.*

DRUPES UNILOCULAR.

§ 2. RYCKIA. Stamens connate in bundles.
Stigma on the upper surface of the style.
Stigmas forked.
Syncarp solitary oblong thick over a foot long 2. *P. Houlletianus.*
Syncarp solitary globose, Leaves conspicuously 3-nerved.
Stem erect. leaves 1-3 feet ... ... 3. *P. bidens.*
Stem submerged prostrate. Leaves very long sword-shaped ... ... 4. *P. immersus.*
Leaves not conspicuously 3 nerved.
Syncarp large solitary ... ... 5. *P. bicornis.*
Syncarps several globose ... ... 6. *P. stelliger.*
Style simple.
Drupes convex abruptly terminated by the style.
Style distinctly swollen at the base ... 7. *P. Prainii.*
Style not swollen at the base. Syncarp cylindric. A tall plant 20 feet high ... 8 *P. helicopus.*
Drupes with a conic top passing into the style.
Leaves broad and short, syncarp oval ... 9. *P. Scortechinii.*
Leaves long, very long caudate, syncarp cylindric ... ... 10. *P. Johorensis.*
Leaves linear ... ... 11. *P. militaris.*

§ 3. ACROSTIGMA. Stamens free. Stigmas on the lower face of the style. Syncarps solitary terminal.

Drupes smooth or distinctly angled. Syncarps globose. Leaves broad 3 nerved abruptly caudate.	
Syncarp 1½ inch long	12. *P. parvus.*
Syncarp 2 inches long	13. *P. glaucophyllus.*
Leaves linear very long and stiff almost stemless	14. *P. ovatus.*
Erect plant leaves linear subherbaceous ...	15. *P. collinus.*
Drupes pyramidal at the tip attenuate into the style.	
Syncarps ovate-elliptic. Drupes broad with a rounded top. Leaves glaucous beneath	16. *P. monotheca.*
Drupes very narrow. Leaves not glaucous	17. *P. Ridleyi.*
Syncarp oblong	18. *P. unguiculatus.*
Syncarp cylindric	19. *P. ornatus.*
Syncarps always spicate.	
Syncarps 6 oblong ovoid	20. *P. atrocarpus.*
Syncarps oblong	21. *P. penangensis.*
Syncarps globose apex of drupes conic ...	22. *P. aurantiacus.*
Apex of drupes broad angled	23. *P. perakensis.*

§ 1. KEURA.

1. P. FASCICULARIS, Lam. Encycl. 373, t. 1. A large shrub often forming large clumps, 10 to 15 feet tall and much branched. Leaves long linear caudate acuminate glaucous beneath, 6 feet or more long 2 inches across with strong grey upcurved thorns on the edge and decurved ones on the keel. Male inflorescence 2 or 3 feet long. Bracts 3 feet long, 2 inches wide white leaf-like with green tips, edges and keel thorny. Spikes 3 or more, 3 inches long. Stamens connate in tufts ½ an inch long, white, free portion of filaments recurved. Anthers in whorls long narrow. Syncarps as big as a man's head, bright orange red 6 to 8 inches through. Drupes confluent hard and woody 2 or more inches long, obconic top rounded. Kunth. Enum. III. 98. Solms, Laubach, Linnaea XLII. 38. Hook. fil. Fl. Brit. Ind. VI. 485. *P. odoratissimus* Roxb. Cor. Pl. I. 65, t. 94, p. 6. Fl. Ind. III. 738. Kunth. l.c. 94. Griff. Notul. III. 159. I.c. Pl. As. t. 174.

P. candelabrum Kurz. Journ. Bot. V. 1867, 127 (not Beauv.) and *P. verus* Kurz. l.c. 125. *P. odoratus* Salisb. Prodr. 3. *P. Rheedii.* Gaud. Voy. Bonite Bot. t. 22, f. 12. *P. leucacanthus* Hassk. Flora 1842 II. Beibl. 14. *P. tectorius* Warb. Pflanzenreich IV. p. 46.

Singapore: Sea Coasts, Sungei Jurong (Ridley 5003); Johor: Tanjong Bunga (Ridley 6289); Malacca Coasts; Pahang: Pekan, etc. Distrib. India, Malay Islands, Polynesia, China, Mauritius. Common

on all sandy coasts and often planted for fences and for mat making, attaps etc. Native names " Pandan Duri," " Pandan Todas."

§ 2. RYCKIA.

2. P. HOULLETTII, Carriere. Rev. Hort. 1868, 210, f. 23. Stem 7 or 8 feet tall to the leaves, simply or not branched at the top, 4 inches through. Aerial roots 2 inches through. Bases of leaf-sheaths persisting. Leaves numerous linear gradually acuminate 8 feet long 4 inches wide coriaceous dark green, coppery, purple when young, point about 6 inches long, spines very small, sharp, curved with brown tips. Male panicles 2 or more feet long, spikes dense 6 to 8 inches long, ¾ inch thick. Lower bracts 14 inches long, 3 inches wide broadly lanceolate acuminate with small thorns on the edges. Upper ones much smaller, terminal one 6 inches by 1 inch. Stamens, filaments connate in bundles branching at the top thick nearly ¼ inch long; anthers dorsifixed oblong with a long point, dehiscing for their whole length. Female spike solitary, in fruit cylindric 12 inches long, orange coloured fleshy. Drupes small ½ inch across angled, crown flattened truncate. Style 1 or 2 curved sharp. Hook. fil. Fl. Brit. Ind. VI. 486.

Singapore: Bukit Timah and other woods, (Ridley); Johor: Sungei Tebrau. " Pandan hutan," " Mengkuang Hutan." In dense forests. The fruit is eatable and tastes like a pineapple. Endemic.

3. P. BIDENS, n. sp. Shrub 5 to 8 feet tall. Leaves broad linear acuminate caudate 1½ to 3 feet long, 2-3 inches wide, bright green, margins, keel towards the tip and tail armed with short pale thorns with fuscous tips, nerves prominent three, nervules and transverse nervules prominent. When dry, giving the leaf a tessellate appearance. Head solitary oblong sessile or nearly so. " When full grown 4 to 5 inches long by 3 inches wide of a dark claret colour, with glossy thorns. Drupes ½ inch long free portion conic obscurely angled. Style flattened rather long ending in two sharp horizontal points.

Perak, open jungle on Gunong Malacca 1500 to 2000 feet alt. (King's Collector 7228). Endemic. This is allied to *P. bicornis* Ridl. but differs in form and structure of the leaves, and the flattened style. *P. crinifolium*, Martelli l.c. 301? The whole description of this is " Styli furcati syncarpia solitaria. Drupae obovatae cuneatae pileo convexo retundato. Stylus brevis aculeiformis. Syncarpim solitarium ovatum 10-13 cent. longum. 7-8 cent. diam. Caverna mesocarpica magna 7 mm., diam. Folia 7-8 cent. lata apice rotundato abrupte in caudiculum producto. Penis. Malese Perak. H. Calc." It may be intended for this species but is a quite insufficient description.

4. P. IMMERSUS, Ridley Journ. As. Soc. S. Br. Vol. 41, p. 48. A stout pandan growing immersed in water, the stem rising but little above the surface. Leaves many feet long broadly linear erect 4 inches

across, glaucous beneath acuminate with a long point, thorns numerous brown. Female spike on a stout flexuous peduncle 2 inches long and half an inch through, oblong thick green 4 inches long 1½ inch through. Drupes small with a very stout simple curved style, occasionally bifurcate as in the preceding species.

Selangor: Labu river, forming dense thickets, also Batu Tiga; growing in streams and conspicuous from its grey, erect, sword-like leaves. Native name "Mengkuang Ayer." Endemic.

5. P. BICORNIS, Ridley Journ. Roy. As. Soc. S. Br. Vol. 41, 49. Stems short, only 1 or 2 feet tall. Leaves dark green, glaucescent at the top, 2 feet or more long 2 inches wide, broadly linear and tapering quickly into a very thorny tail 3 inches long, edge and keel especially at base armed with numerous recurved thorns. Female bracts broad ovate, outer ones rather abruptly acuminate 6 inches long with a slender point 2 inches long thorny, inner bracts obtuse. Head solitary, oblong, rounded at the top 4 inches long and nearly as broad, green. Fruits nearly ½ inch through ¾ inch long, top broad, free obscurely angled. Style broad, short, with 2 spreading short, sharp horns with broad bases, about ⅛ inch long.

Perak: Larut Hills in dense forest at 2500 to 3000 feet alt. (Ridley). Endemic.

6. P. STELLIGER, Ridl. Journ. Roy. As. Soc. S. Br. Vol. 41, p. 49. A slender stemmed pandanus about ten feet tall, branched. Leaves linear acuminate shining grey green over a foot long and an inch wide, point long and narrow 3 inches long, thorns distant except at the point which is very thorny. Male flowers not seen. Syncarps oblong ovoid 2 inches long and over an inch through in a cluster of 4, nearly sessile. Drupes large ¼ inch through, style oblong top square with 3 or 6 sharp points, apex rough.

Selangor: at the 20th mile Pahang Track (Ridley 8775), in forest. Perak: Larut Hills at 2500 feet alt. (Ridley). Endemic. This was referred to *P. minor* Ham. by the authorities at Kew but differs in the clustered fruits and the form of the style. The top of the style is quite flat and square in outline, with from 3 to 6 horizontal points.

7. P. PRAINII, Martelli. Boll. Soc. Bot. Ital. 1904 p. 301. A small pandan stem 8 to 12 feet long. Leaves stiff and thick glossy rich green, drying pale yellowish, nerves invisible linear acuminate wide. Margins armed with small pale thorns, keel with fewer distant ones, tip closely, shortly, thorny. Male inflorescence not seen. Female syncarp 4 or 5 inches long 2-3 inches thick on a stout peduncle elliptic oblong in form. Pistils small, style with a distinct rounded bulb-shaped base, detaching above it, terete acuminate rather short pale coloured. Stigma linear on the inner face. Drupes narrow oblong erminated by the hemispheric bulb.

Perak: Chanderiang (King's Collector 5811). In small water holes with the top of the fruit just above water. Endemic. I suppose this is the plant Martelli intended by his description or rather diagnosis, but he does not give the locality or number and his diagnosis is very short.

8. P. HELICOPUS, Kurz. Miq. Ann. Mus. Lugd. Bat. II. 54, t. II. Stems branched rather irregular and chiefly at the base 15 to 20 feet tall 3 inches through, ringed with leafscars thorny dark red brown becoming purplish grey. Leaves glaucous persisting only at the top of the stem, linear long acuminate 6 feet long, 3 inches wide, bases red or orange, terminal half of the leaf deflexed, spines black short and strong erect on base of leaf edges, recurved on midrib. Male inflorescence long. Bracts lanceolate long acuminate white fragrant, 10 to 12 inches long 1 inch wide, narrowed at both ends, spikes dense 9 inches long $\frac{3}{4}$ inch through. Stamens connate in bundles, the filaments forming a hairy oblong process truncate at the top. Anthers linear with a short point. Female, syncarp solitary $2\frac{1}{2}$ inches long on a slightly flexuous nodding peduncle 9 inches long. Styles long in proportion to the ovaries. Fruit cylindric woody, apex and base broad blunt 5 inches long 3 inches through. Drupes narrow $\frac{1}{8}$ inch through, style single short slender hardly $\frac{1}{8}$ inch long golden brown.

Johor: Sungei Tebrau, Kota Tinggi (Ridley 5002); Selangor: Rawang (Ridley 7655). Distrib. Sumatra, Banka. Native names "Resau." This plant forms dense masses for miles in rivers, often blocking the waterway. The fruit is used by the natives of Sumatra for baiting fish traps.

9. P. SCORTECHINII, Martelli l.c. 302. Apparently a dwarf plant 2-4 feet tall, stem $\frac{1}{4}$ inch through, covered with the persistent sheaths. Leaves linear lorate caudate, 9 inches long, 1 inch across, main nerves inconspicuous, secondary nerves few, base armed with rather large red tipped thorns, tip and tail with more numerous short ones, middle portion almost or quite thornless. Male inflorescence, bracts broadly lanceolate, acute, unarmed, papery ribbed $2\frac{1}{2}$-2 inches long, $\frac{1}{2}$ inch wide. Flower spikes cylindric 3 inches long, $\frac{1}{2}$ inch through. Stamens connate at the base with extremely short bulbous filaments much shorter than the oblong stamens. Female syncarp solitary on a peduncle, 2 inches long, oval 1 inch long, $\frac{3}{4}$ inch through. Drupes prismatic oblong, tip cuneate, pyramid-shaped. Styles long setiform acuminate shining.

Perak: Asam Kumbang, (Wray 1939, 3259); Larut Hills (King's Coll. 3557). Endemic.

10. P. JOHORENSIS, Martelli, l.c. 302. Leaves very long linear rather firm textured, ending in a very long slender tail, main nerves indistinct, thorns rather large, distant, except at the tip, 3 feet long, 1 inch wide, the very slender triquetrous tail nearly a foot long. Female

syncarp solitary on a peduncle 10 inches long, erect, slightly flexuous. Bracts leaf-like, lanceolate acuminate. Syncarp (young) oblong 2 inches long. 1 inch through. Drupes with a rounded top. Style setiform, yellow, rather long, acute. Stigma upwards.

Muar: Bukit Wilgu, Sungei Pauh (W. Fox) 11326. Endemic.

11. P. MILITARIS, Balf. fil. Journ. Linn. Soc. XVII. (1879) 53. A bushy pandan about 5 feet tall. Leaves narrow, linear acuminate to a long point, 2 feet long, $\frac{1}{4}$ inch wide, dark green edged the whole length with pale red tipped thorns. Male flowers not seen. Female syncarp solitary on a curved peduncle 4 inches long. Syncarp cylindric green 3 inches long, 2 through in fruit, $\frac{3}{4}$ in flower. Drupes $\frac{1}{2}$ inch long, base narrow cylindric, dilated above oblong rounded at the top with a short dagger-like style broad based. Warburg Pflanzenr. IV. 79. *Fisquetia militaris*, Gaud. Voy. Bonite. 1843, t. 5, fig. 2-7.

Singapore: Bukit Mandai (Ridley, 5859), (3941, 6675); Pahang: Ulu Kwantan (Craddock). Native name "Pandan." Endemic. I have found plants with several small syncarps instead of one large one.

12. P. PARVUS, Ridl. Journ. As. Soc. S. Br. 1900, Vol. 33, p. 171. Stem 3 feet tall or less, $\frac{1}{2}$ an inch in circumference erect grey, emitting slender roots from all parts, branching little above. Leaves a foot long, 3 inches wide, abruptly caudate, the point 2 inches long very slender, dull green above, glaucous beneath, rather thin in texture, spines very small numerous on the keel at the apex and edges rather thin in texture. Male inflorescence 6 inches long white. Bracts oblong boat-shaped keeled mucronate, lowest 4 inches long, mucro an inch long in the two lower bracts which are empty, upper bracts smaller. Flowering bracts 7 softer ivory white spinulose ovate to ovate lanceolate, terminal one flat lanceolate $\frac{1}{2}$ inch long. Spikes 5 shorter than the bracts (except the terminal one). Stamens free very slender $\frac{1}{8}$ inch long. Female inflorescence solitary globose about $1\frac{1}{2}$ inch long. Carpels conic, style long brown shining $\frac{1}{4}$ inch long. P. sp. 15 Hook. fil. Fl. Brit. Ind. VI. 487. *P. flagellifer* Warb. Pflanzenr. IV. 80.

Singapore: Changi (Ridley 3938), Pulau Ubin, Kranji (Ridley 8928); Johor: Sungei Ban (Ridley), Sungei Tebrau, Sungei Ujong (in Herb. Bot. Gard. Singapore); Malacca (Griffith); Perak: Bujong Malacca (Ridley 7659). "Pandan Kura." Inhabits dry woods. Common. Endemic.

13. P. GLAUCOPHYLLUS, Ridl. Journ. Roy. As. Soc. S. Br. Vol. 41 p. 50. Stems about 10 to 12 feet tall $\frac{1}{2}$-1 inch through. Leaves crowded at the top 1 to 2 feet or more long 2 inches wide, glaucous broadly linear oblong, tip abruptly acuminate, edge minutely denticulate, rather flaccid, midrib prominent, with very small thorns. Syncarp globose 2 inches long on a peduncle about 3 inches long stout. Drupes rounded

tapering into a stout upcurved simple spine $\frac{1}{6}$ inch long, grooved above tip acute.

Perak: Thaiping Hills in dense forests (Ridley). Endemic. Local. This is allied to *C. parvus* (Ridley) but a very much larger plant in all its parts.

14. P. OVATUS, Kurz. Journ. As. Soc. Beng. XXXVIII. 1869, 147. Flora 1869, 451. A low creeping plant with a stem $\frac{1}{4}$ inch through, rooting all along. Leaves crowded linear acuminate, greyish green a foot or more long $\frac{1}{4}$-$\frac{3}{8}$ inch wide, stiff, with rather numerous thorns. Male inflorescence not seen. Fruit almost sessile among the leaves globose $1\frac{1}{2}$ inch through. Carpels broad top rounded, depressed in the centre when dry. Style conic, stout, curved acuminate. Hook. fil. Fl. Brit. Ind. VI. 486. Warburg. Pflanzenr. IV. p. 80. *C. elostigma*, Martell, l.c. *Fisquetia ovata*, Gaud. Voy. Bonite. t. 4, f. 1.

Malacca: (Gaudichaud), Selandor (Ridley), Ayer Panas (Goodenough 1533); Province Wellesley: Tasek Gelugur (Ridley 7006); Kedah: Gunong Jerai (Low). Distrib. Siam (Kasum Curtis 3427). Native name "Sindayen Masing," occurs in woods, not very common. cannot separate *C. elostigma* Martelli from this by the specimens except that the leaves are somewhat larger. It was obtained in Larut on rocky soil in open ground (King's Coll. 3758, 6559).

15. P. COLLINUS, n. sp. Dwarf pandan 4-7 feet tall. Leaves linear gradually acuminate, 15 inches long, $\frac{1}{4}$ inch wide rather thin with pale red tipped thorns very small and not very close, for the whole length. Syncarp globose on a peduncle 3 inches long; 1 inch long $\frac{3}{4}$ inch through. Drupes dilate, rounded at the top. Style $\frac{1}{8}$ inch long conic acute, tooth-shaped, angled, stigma for $\frac{1}{4}$ of its length.

Perak: Gunong Batu Putih 3000 to 4300 feet altitude (Wray 1026, King's Coll. 8034); Kedah: Gunong Jerai (Ridley). Resembles *P. ovatus*, but the foliage is thinner and less rigid, the syncarp very much smaller. Endemic.

16. P. MONOTHECA, Martelli, l.c. 303. A bush resembling *P. ornatus*, with stout stems. Leaves 3 feet long, $\frac{1}{2}$ inch wide, linear acuminate caudate, with rather close pale thorns along the edge the whole length. Syncarp oblong 2 inches long, 1 through, on a short 4 inch peduncle. Drupes obovate with a broad rounded top with 5 ribs radiating from the style. Style very short, dagger-shaped. Stigma for the whole length. Mesocarp not hollow spongy,—woody. Endocarp obtriangular.

Malacca: on Gunong Tunduk, Mt. Ophir (Ridley 10821) at 4000 feet alt. Endemic.

17. P. RIDLEYI, Martelli l.c. p. 303. Eight to 10 feet tall, stem $1\frac{1}{2}$ to 3 inches through. Leaves glossy deep green, linear long acuminate 14-18 inches long, 1 across with small thorns very close along the

edge, red, keel in upper part thorny, nerves invisible. Male inflorescence waxy white. Spadices 2 cylindric, 2 inches long on peduncles, 1½ inch long. Stamens separate, anthers oblong, filaments slender twice as long. Female syncarp solitary enclosed in broad lanceolate acuminate bracts the lowest leaf-like, 8 inches long, upper ones 5 inches long, one inch broad ovate lanceolate, margins very closely set with small thorns, peduncle 6 inches long, stout. Syncarp oblong cylindric 2¾ inch long, 1 inch through. Drupes narrow oblong ⅛ inch long, style as long erect cylindric setiform yellow when dry. Stigma linear, upwards. *P. Yvani* Solms-Laub. Linnaea XLII. 1878, 21? Native name "Pandan Tikus."

Singapore: Bukit Mandai (Ridley 10439), (in part) Serangoon Road; Malacca: Sungei Udang (Ridley 1588); Selangor: Bukit Kutu (Ridley 7660); Ginting Bidai Woods (Ridley 7658); Perak: dense jungle wet ground (King's Coll. 6839); Sungei Ujong: Gunong Berumaun. Endemic. This may be the plant intended by Solms-Laubach for his *P. Yvani*. The linear stigmas are pointing upwards so that this should be a *Ryckia*, but if my identification of the male is correct the stamens are free, a character of *Acrostigma*. Martelli classes it as an *Acrostigma*. His description is very curt and he makes no mention of the peculiar spathes.

18. P. UNGUICULATUS, n. sp. A small plant. Leaves linear lorate acuminate caudate 20 inches long, 1 inch wide, thin, primary nerves invisible, margins armed with small scattered pale thorns, red tipped those on the keel at the tip and the tail very small. Syncarp solitary, oblong, 2 inches long, 1¼ inch through, on a peduncle 2 inches or more long. Drupes linear oblong ½ inch long, top conic 5 angled broad, style curved upwards, beak-shaped acute, short. Stigma linear for its whole length.

Selangor: Bukit Kutu (Ridley 7659). Endemic. Allied to *C. parvus* Ridl. but differs in the less armed leaves, the much larger oblong syncarp, and very much larger drupes.

19. P. ORNATUS, Kurz. Journ. As. Soc. Beng. XXXVIII. 1869, 747. A bush about 12 feet tall densely branched. Stems crowded erect grey nearly smooth, thorny above, obscurely ringed. Leaves narrow linear gradually acuminate light green above, glaucous beneath, 6 feet long, 1 inch wide, spines very small and close, white, on the edges and keel and on the two nerves on the upper surface at the tip. Male inflorescence 9 inches long with 6 spikes. Bracts lanceolate cuspidate 6 inches long, ¾ inch wide or less, tip and edges and keel in upper part minutely thorny. Spikes 3 inches long over ¼ inch through, cylindric blunt. Anthers free, linear cuspidate, with extremely short filaments. Female bracts 3-4 narrow lanceolate acuminate. Syncarp usually solitary rarely 3 together, on a stout hanging peduncle, about 8 inches long, ¼ inch through, triquetrous with 5 or 6 distinct bracts.

Syncarps cylindric glaucous green, 6 inches long, 2 inches thick. Drupes numerous ½ inch long, oblong, apex irregularly angled ⅛ inch across. Styles solitary curved forwards ⅛ inch long, brown acute. Stigma nearly the whole length of the style. Kurz. Flora 1869, 451. Hook. fil. Fl. Brit. Ind. VI. 486. Solms-Laubach Linnea XLIII. 1878. p. II. Warburg Pflanzenreich, IV. p. 81, p. 1, 22, p. *Fisquetia ornata*, Gaud. Voy. Bonite. Bot. t. 5.

Singapore: Bukit Timah (Ridley 6287, 3941); Johor: Gunong Pulai, Kota Tinggi; Malacca: Mt. Ophir (R. Derry 617), Nyalas (Goodenough 1245), Selandan (Ridley 10806) a specimen with 5 syncarps; Selangor: Bukit Kutu; Dindings: Tanjong Hantu (Ridley, Curtis 1552); Penang Hill (Ridley 9427, Curtis 2272), Kedah Gunong Jerai (Ridley); Perak: Larut (Kunstler 2015). Common in woods to 3000 feet elevation. Male plants are very scarce and I have rarely seen ripe fruit. Native name "Pandan Berduri." Endemic.

20. P. ATROCARPUS, Griff. Notul. III. 160. Stem 40 to 60 feet tall about 6 inches through, grey and thorny with suppressed rootlets. Leaves linear acuminate, with a long point coriaceous, dark green channelled on the upper surface, edge and keel thorny, thorns distant below closer together at the point, stout and brown tipped; length of leaf 20 feet, width 4 inches. Male spadix 2 feet or more long. Bracts white, the lowest a foot or more scabrid at the tip. Spikes 4 to 6 inches long, fragrant white. Stamens free, filaments very short, stout conic. Anthers much longer linear narrow with a short flat appendage. Female inflorescence 3 to 4 feet long, peduncle stout woody 3 angled 1 inch through zig-zag. Spikes about 6 ovoid oblong 3 inches long 2½ inch through. Fruits an inch long about 25 in a circle. Upper portion ¼ or more long, conic irregularly angled deep brown, scabrid. Style short conic acute slightly curved. Seeds about ½ inch long.

Singapore: Tanglin (Ridley 5), Bukit Mandai Road (10950); Malacca; Johor; probably common over most of the peninsula. Distrib. Banca. This is known to the Malays as "Mengkuang" and the leaves are used for making kajangs (coverings for ox carts) screens, hats, &c. There can be no doubt that the plant described by Griffith under the name *P. atrocarpus*, was intended for this common species, but the native name he gives "Pandan ootan" (hutan) is not correctly applied to it. *P. caricosus*, Spreng. to which this species is referred in the Flora of British India VI. p. 1184 is altogether a different plant.

21. P. PENANGENSIS, Ridl. Journ. Roy. As. Soc. S. Br. Vol. 41, p. 50. A tall and stout plant with a stem like that of *P. atrocarpus*, but shorter, about 20 feet tall, 4 inches through. Leaves very long linear acuminate 6 feet or more long, 4 inches across, often marbled light and dark green with thorns along the edges and keel rather stout and crowded towards the tip. Heads 4 or 5 together on a short peduncle green,

oblong 6 inches long 3 inches through. Drupes an inch long, free portion conic angled, $\frac{1}{3}$ inch long. Style strong, simple hard, dark brown, polished curved forwards $\frac{1}{2}$ an inch long.

Penang : Government Hill (Ridley). Endemic.

22. P. AURANTIACUS, Ridley Journ. Roy. As. Soc. S. Br. Vol. 41, p. 49. A large branching shrub, about 12 feet tall. Leaves over 3 feet long $1\frac{1}{2}$ inch wide, glaucous linear long acuminate, with numerous close small thorns on the edge and keel. Female inflorescence with a stout rachis about a foot long. Syncarps five globose oblong $2\frac{1}{2}$ inches long by 1 through, orange coloured. Drupes large, $\frac{3}{4}$ inch long, oblong pyramidal 5 angled apex conic passing into a long stout but not very hard beak. *P. sarawakensis*, Martelli ? Tidal thickets, " Pandan Ikan."

Singapore : Bukit Mandai Road ; Johor : Tanjong Bunga, Pulau Kukub ; Pahang : Kwala Lipis (A. D. Machado). Distrib. Borneo, Siam.

23. P. PERAKENSIS, n. sp. Leaves 5 feet long, $1\frac{1}{2}$ inch wide, light coloured when dry linear acuminate with strong pale thorns at the base along the edge and smaller closer set ones above, secondary nerves obscure. Syncarps 3 or 4 oblong globose 2 inches long, on a stout peduncle 6 inches long, drupes linear, oblong, $\frac{1}{2}$ inch long ending in a 5-angled pyramidal style with a stout spine-like point. Stigma rather broad as long as the point.

Perak : Maxwell's Hill ; Lahat near Ipoh (Ridley). Endemic.

P. sp. Stem stout, eventually about 10 or 12 feet tall, but more commonly a low branching plant. Leaves 30 inches long, 2 inches wide, glaucous beneath, light above, linear acute, thornless except for a few minute thorns at the tip.

" Pandan Jelinkeh," " Pandan Wangi." This is commonly cultivated round villages, for the scented leaves, which, boiled with rice, impart an aromatic taste to it. It is also cut up very fine and mixed with sandal wood and rose water to make a scented kind of potpourri (Gunga Rampeh) distributed at Malay weddings. I cannot find that this has been described anywhere, nor have I ever seen flowers, or met anyone who has seen flowers or fruit of it.

P. sp. Epipytic forming large tufts very high up in lofty trees, leaves narrow. Common in Johor and Perak, but I have never seen a trace of inflorescence.

DOUBTFUL SPECIES.

P. yvanii, Solms-Laub. Linnaea XLII. 20. Malacca (Yvan), the description is much too meagre to make it possible to identify this. It is possibly *P. militaris*, Gaud. or *P. aurantiaca*, Ridl., or *P. Ridleyi* Mart.

P. herbaceus, Martelli. l.c. 303. *Acrostigma.* "Syncarpia (solitaria) 3 cent. diam. globosa, drupae ovate, cuneatae 1 cent. longae, 5 mm. latae, caverna mesocarpica, bene manifesta 2 mm. longa. Irang (Trang) Perak."

2. Freycinetia, Gaud.

Scandent shrubs climbing often to a great height. Stems rather slender rooting. Leaves narrow acuminate as in *Pandanus*. Bracts often brightly coloured, yellow or red, and not leaf-like. Spikes racemose, peduncle cylindric. Males slender, filaments filiform or conic. Anthers ovate. Female spikes stouter, of numerous carpels often with staminodes. Ovary unilocular. Seeds numerous. Stigmas sessile, usually horseshoe-shaped. Species 60, Burmah, Ceylon, Malay Islands, and Polynesia.

Bracts not leaf-like, orange or red.
- Leaves very narrow $\frac{1}{8}$ inch across.
  - Bases unarmed ... ... 1. *F. angustifolia.*
  - Base and sheath armed ... ... 2. *F. confusa.*
- Leaves narrow, stiff, $\frac{1}{4}$ inch wide, armed at the base. Bracts stiff, long, acuminate ... ... 3. *F. acuminata.*
- Leaves rather placcid $\frac{3}{8}$ inch wide, not narrowed at the base ... ... 4. *F. malaccensis.*
- Leaves $\frac{1}{2}$ inch wide, narrowed at the base. Bracts large, stiff, boat-shaped ... ... 5. *F. lucens.*
- Leaves $\frac{1}{2}$ inch wide not narrowed at the base, unarmed. Bracts flat, lanceolate 6. *F. montana.*

Bracts leaf-like, Leaves long linear wide at base, unarmed. Fruit spike 2 inches long ... ... 7. *F. Kingiana.*
- Leaves very long linear armed. Spikes several, very large ... ... 8. *F. valida.*

1. Fr. angustifolia, Bl. Rumphia I (1835) 159, t. 43. Stems very slender $\frac{1}{8}$ inch through, very long. Leaves narrowly linear acuminate 9-10 inches long, $\frac{1}{8}$ inch wide, base dilated, unarmed except a few thorns at the tip. Male inflorescence. Bracts 4 ovate acuminate, to ovate lanceolate $\frac{1}{2}$ to 1 inch long, $\frac{1}{2}$ inch wide, tip armed with 3 lines of minute spines. Spadices 4 umbellate slender cylindric $\frac{1}{2}$ inch long. Female spadices racemose rather distant 3 or 4. Bracts as in male but a little longer. Spadices $\frac{1}{4}$ inch long on a peduncle of equal length cylindric $\frac{1}{8}$ inch through. Pistils oblong very small, stigmas 1 to 3. Native name "Rotan Musang," "Akar Ular."

Malacca: Merlimau (R. Derry), Bukit Bruang (Derry 1197). The leaves in the female are nearly twice as broad as in the male.

VOL. II.

Errata Vol. II.

P.	14	line	22.	Scaphochlymas read Scaphochlamys.
	16	„	15.	Scaphochlymas read Scaphochlamys.
	16	„	26.	Malaccana Pflazen. Schum. p. 81. Cumingii read Malaccana Schum. Pflanzenr. p. 81. K. Cumingii.
	17	„	3.	linar read linear.
	21	„	30.	Retobs read Retz. Obs.
	73	„	23.	Mip. read Miq.
	127	„	34.	Guryanensis read Guyanensis.
	165	„	18.	After lanuginosa read Ridl.
	200	„	41.	intunescens read intumescens.
	220	„	33.	Japanese read Javanese.

2. F. CONFUSA, n. sp. Stem woody, $\frac{1}{4}$ inch through. Leaves narrowly linear acuminate 9-12 inches long, $\frac{1}{8}$ inch wide, sheath long ribbed with a chartaceous smooth edge, armed with a few sharp brown thorns, base of leaf about $1\frac{1}{2}$ inch armed with short sharp thorns, the tip with very small thorns, rest of the leaf unarmed. Female inflorescence. Bracts lanceolate acuminate lowest one thorny on the edge. All thorny on the tip and keel, 2 inches long, $\frac{3}{4}$ inch wide, ribbed. Spadices 2 nearly sessile, cylindric stout, 1 inch long, $\frac{1}{4}$ inch through. Pistils oblong angled. Stigmas 1-2, distant from each other.

Singapore: Selitar (Ridley 4757), Kranji; Perak: Batu Tugoh (Wray 2157). Endemic.

3. F. ACUMINATA, n. sp. Stem stout $\frac{3}{8}$ inch through. Leaves stiff erect linear acute 12 inches long, $\frac{1}{4}$ inch wide, sheath provided with a pair of ligule-like processes $\frac{1}{4}$ inch long armed with flattened acute thorns on the edge, base of leaf edged with dagger-like yellow thorns, tip with very small thorns. Bracts lanceolate long acuminate, lower one edged with thorns 7 inches long, point longer than the blade second bract 6 inches, all red spadix not seen. Female spadices 3 almost sessile cylindric, 1 inch long, $\frac{1}{4}$ inch through. Pistils oblong, blunt, top flattened angular, stigmas 1 or 2.

Selangor: Kwang (Ridley 7656). The habit of this is that of *F. angustifolia*, but it is much larger in all its parts, the stiff leaves and large bracts distinguish it.

4. F. MALACCENSIS, n. sp. Stem slender $\frac{1}{8}$ inch through. Leaves rather flaccid, linear somewhat abruptly acuminate, 9 inches long, $\frac{3}{8}$ inch wide, rather distant, sheath very short, unarmed, point and keel for some way down armed with small thorns. Male inflorescence, bracts orange buff, 6 lower ones lanceolate caudate unarmed except the tip, lowest 1 inch long with point 2 inches, uppermost $\frac{3}{4}$ inch long, $\frac{1}{4}$ inch wide, lanceolate acute. Peduncle $\frac{1}{2}$ inch long, spikes very slender $\frac{1}{2}$ inch long, peduncle of spike $\frac{1}{2}$ as long as spike. Female bracts as in male but fewer. Spadices 4, fleshy when ripe, $\frac{3}{4}$ inch long, $\frac{1}{4}$ inch through cylindric shortly pedicelled on a stout peduncle nearly 1 inch long. Pistils fleshy rounded at the top. Stigmas elevated 2-3. Native name "Nanchang Besih."

Singapore: Bukit Mandai (Ridley 1643), Bukit Timah (5120); Johor: Kota Tinggi (Ridley 4142); Malacca: Mt. Ophir (Ridley 3895), Bukit Bruang (Ridley 406); Perak: Sonkai (King's Coll. 3052); Penang: Telok Bahang (Curtis 1171), Penang Hill (Ridley). Endemic.

5. F. LUCENS, n. sp. Stems $\frac{1}{8}$ inch through, strongly ribbed with a few ribs when dry. Leaves rather distant, deep shining green linear, oblong, narrowed at the base and ending in a cusp, 4 to 5 inches long $\frac{1}{2}$ inch wide, unarmed, except a few thorns on the tip, sheaths short hardly meeting round the stem. Male inflorescence, bracts canoe-shaped, orange-salmon colour, 3 inches long, $\frac{1}{2}$ inch wide, thick, cuspidate,

cusp shortly thorny. Spikes 3, very slender, 1½ inch long less than ⅛ inch through, base about ⅓ inch wide. Female bracts as in male. Spikes 3 almost umbellate 1½ to 2 inches long, cylindric blunt, fleshy ½ an inch through when dry. Stigmas closely approximated 4 to 8. *F. Gaudichaudii* Hook. fil. Fl. Brit. Ind. l.c. 488.

Singapore: Bukit Timah (Ridley 3703), Bukit Mandai (4618), Kranji; Negri Sembilan: Seremban (Egerton); Perak: Larut (King's Coll. 4003, 4091, 4194, 7578), Thaiping (8523). This is the plant commonly recorded as *F. Gaudichaudii*, for the Malay peninsula. It seems however distinct.

6. F. MONTANA, n. sp. Stem ⅙ inch through. Leaves rather distant 6-7 inches long, ½ inch wide, finely ribbed when dry, linear acuminate unarmed except for a few short thorns on the tip, sheathing portion edged with a broad smooth brittle margin. Male inflorescence, bracts lanceolate flat 2½ inches long or less ½ inch wide acuminate, edges armed with short upcurved thorns. Spadices 3, very slender, 1¼ inch long, nude portion ⅓ of the length angled with short hair-like processes along the angles. Female spadices 3-4, cylindric obtuse 1-1½ inch long, ¼-⅓ inch through, peduncles very short, ¼ inch long, umbelled, angular with hair-like processes on the angles. Drupes fleshy free portion rounded with 4 to 6 stigmas.

Selangor: Bukit Hitam (Ridley 7657); Perak: Thaiping Hills Ridley 5194), (King's Coll. 2619). Endemic.

7. F. KINGIANA, n. sp. Stem $\frac{3}{10}$ inch through. Leaves lanceolate, linear acuminate 8 inches long, ½ inch wide, unarmed except for some pale thorns at the base and some very obscure ones at the tip, pale when dry with the midrib prominent on both sides, sheathing portion long, over an inch with a narrow papery edge, unarmed. Male flowers not seen. Spathes of female leaf-like but shorter, lanceolate acuminate thorny along the edge. Spadices 1 to 2, oblong ½ to 1½ inches long on a peduncle rather stout and curved with ovate sheaths, peduncle (nude portion of spike) 1 inch long, terete. Pistils in front fleshy only at the base, free portion conic angled, stigmata 2-3 reniform.

Perak: Goping (King's Collector 4654, 1056) "40 to 60 feet long. Leaves glossy light green. Fruit dark green. Flowers yellow. Bracts yellowish." Endemic.

8. F. VALIDA, n. sp. A very stout climber 20 or 30 feet long, ¼ inch through. Leaves long linear acuminate dark green 24 inches long, ½ to 1½ inch wide, sheath large armed at the top with thorns, edge thorny. Male inflorescence not seen. Female, bracts leaf-like not coloured distinctively. Spikes 1 to 3, umbellate on a stout cylindric peduncle. 1½ inch in flower to 4 inches long, ¾ inch through in fruit, pedicels stout cylindric 2 inches long. Style conic angled free. Stigmas close together 2-4.

Singapore: Garden Jungle, Chua Chu Kang (Ridley 3937), Bukit Mandai (10439); Malacca: Mt. Ophir (Derry Ridley); Penang (Curtis 3538). Perak: Thaiping Hills (Ridley 11891). The Hill forms are rather smaller than those of the plains. It is allied to *F. javanica.*

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